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CHICAGO'S NEW ORDINANCE.

AFTER three years of discussion and investigations by three different experts, the city council of Chicago passed its new telephone rate ordinance, by a vote of 58 to 5, at 12:10 a. m., May 27. It will cut practically $500,000 a year from the income of the Chicago Telephone Company if the subscribers take full advantage of the possible changes in service form which will give them equivalent service at a lower rate. A summary of the new rates reads as follows:

MEASURED SERVICE.

Business.—Single party with minimum of 960 messages per year, $48; next 240 messages, 5 cents each; next 1,200 messages, 3 cents each; next 1,200 messages, 2½ cents each; all additional messages, 2 cents each.

Residence.—Single party with minimum of 800 messages, $40 a year; next 400 messages, 4 cents each; next 1,200 messages, 3 cents each; next 1,200 messages, 2½ cents each; all additional messages, 2 cents each.

FLAT RATE.

Business.—Single party, $125 per year, provided no new contracts for this class shall be made after the ordinance goes into effect. Future contracts, $125 per year, maximum of 500 calls a month. Extra calls, 2 cents each.

Residence.—Single party $72 a year. Two party, $56 a year.

NICKEL FIRST.

One party nickel lines for guarantee of 20 cents a day. Two party business lines for guarantee of 12½ cents a day. Two party residence lines for guarantee of 10 cents a day. Four party residence lines for guarantee of 5 cents a day. All additional messages above guarantee on all classes 4 cents each.

NICKEL LAST.

Same as for nickel first, except all additional calls will be full 5 cents each.

It will be noticed that the business flat rate classification provides that no new contracts of the kind shall be made. This marks the beginning of the end of the overworked flat rate in Chicago. It was one of the provisions the telephone company pleaded for, and it will mean better service. The only logical place for flat rates in public service is where the subscriber consumption can be calculated in advance, or where such consumption would be automatically limited by the equipment of the subscriber. This condition can never be true of telephone service. There is nothing to prevent the telephone subscriber on flat rate from originating calls continually, one after the other, all day long, and day after day. Such abuse means, of course, a loss to the operating company on that line; a line constantly busy to incoming calls, and poor service in general. Measured service is the only satisfactory and efficient telephone service, and Chicago is to have no other after present contracts have expired.

The ordinance also is considered of interest as setting a precedent for rate making measures. It provides

for an annual contribution of $100,000 by the Chicago Telephone Company to the pension and disability fund for the benefit of its employees, and it devotes $195,000 of the surplus established by Bemis to granting increases in wages to these employees. It may be questioned, however, whether this is proper ordinance material. In effect it is little more than a recognition of the company's right so to contribute since the Bell Companies have already made such provision.

The rates for public telephone service and neighborhood exchange service are left as they were. A change in toll service is established by a provision for a five cent charge from telephones on exchanges bordering on the city limits to suburbs immediately beyond the limits.

Two amendments agreed upon did not affect rates directly, but they mean a material difference to a large number of subscribers. The first amendment provides that the provision for refunds on nickel service shall "work backwards as well as forwards." At present the subscriber who falls below his guarantee is compelled to make up the deficit at the time the coin box is emptied. If within sixty days after that time his coin box produces an excess amount above his guarantee he can claim a refund of the amount he advanced for the deficit. The amendment provides that if a deficit is found and the subscriber has paid an excess during the last sixty days equal or more than equal to that deficit the amount below his guarantee cannot be collected from him. In other words, any excess that he has paid within two months will apply to deficit found at the time the collector calls.

Attention was called to a statement of President Sunny of the company in response to a question from expert Bemis concerning this amendment on the refund provision. Mr. Sunny had asserted that the company could not accept the ordinance if altered in that manner; but among the aldermen there was little doubt the new rates and regulations will be accepted by the corporation within the thirty days set by the ordinance as the time in which it must act.

The other amendment went to the subject of charges for meters on measured service. As originally adopted by the committee the ordinance provided that any subscriber could have a meter installed at his end of the line by paying $1.80 a year for that equipment. The amendment provides that any subscriber can obtain a meter by paying one charge of $3, and that the meter shall be connected with his telephone as long as he continues it in service. If he orders the meter taken out he is entitled to a rebate of $1. Whether the company had arranged to supply such meters on demand, however, or if not, where they might be procured, was not stated. Telephone subscribers' meters have been devised whose efficacy there is no reason to question; but it is doubtful if any telephone operating company will feel inclined to encourage their use. The meter question is a large one, and will come up again from time to time, no doubt.

Chicago's rate reductions are more apparent than real. The one factor of flat rate elimination will probably compensate the company for any losses on other rate classes. The large users of flat rate service who have grown accustomed to the freedom of the telephone will not curtail their use of it to any great extent. They will prefer to pay the larger bills of measured service and better service.

Measured service at $48 a year seems a considerable reduction from unlimited service at $125 a year. But it must be remembered that the $48 pays only for 960 calls, or 80 a month, or three a day. An allowance of 3,600 calls a year, which is 300 calls a month or 12 a day—a very modest allowance—brings the measured rate up to $126 according to the figures of the new schedule. It is safe to say that a great many flat rate subscribers habitually entered much more than 12 calls a day. So what at first glance may appear to be a loss to the telephone company is very apt to develop into a gain. But as it will be the gain of not only the company, but of the subscribers as well, there should be considerable satisfaction all around.

STILL ANOTHER USE.

FOR a long time we have been accustomed to get our election returns, our weather reports, and even our ultra-important news, by telephone. Over its wires criminals are apprehended—or warned of possible apprehension by their pals. Trains are operated, flood warnings are sent out, baseball scores are reported. And now is announced another beneficent application of the universal helper.

The people of Texas are to have at their command the telephone lines of the state in the prevention of sickness and epidemic and the health control possible as the experts of the United States are banded together in the close communication and consultation of an organization formed and devised for such a purpose.

Dr. Martin E. Taber of Dallas, medical director of the Southwestern Telegraph and Telephone Company, will appoint recognized physicians in every city where the company maintains an exchange, and this organization will be at the service of communities as conditions of public stress develop. The medical profession will have at command, through representatives of this bureau, the benefit of advice and opinion from the greatest authorities in the country. The organization in Texas will work with similar organizations in every other section of the United States. Peculiar cases, strange or dangerous conditions developing anywhere, will be reported and the benefit of a nation-wide consultation will be afforded, as, almost in the twinkling of an eye, the word is flashed back and forth across the continent.

Thus does one of the greatest, if not the greatest, of man's inventions ever find new fields of usefulness.

VAIL ON UTILITIES AND POLICY.

THEODORE N. VAIL, president of the American Telephone and Telegraph Company and the Western Union Telegraph Company, has written an article for the *Atlantic Monthly* on the subject of "Public Utilities and Public Policy." Mr. aVil's article is not in any sense a brief for his companies or their systems; it is a broad and extremely interesting academic discussion of the theory of public service.

The treatment is based upon the following six fundamental principles laid down as common to all utilities:

1. There are but few utilities which have no alternative or substitute. The alternative or substitute will generally have been less convenient, comfortable, or efficacious, and, consequently, less desirable to the user or consumer but, in the absence of a better, it answered the purpose and was cheaper, and at the time was regarded as the ultimate possibility in the way of comfort, convenience, and luxury. * * *

2. No utility can sell its service or its commodity at a price greater than its value, in comfort or convenience, if not in actual money, to the purchaser or consumer; and the price and quality

of service or commodity must be so regulated that enough can be sold to produce net revenue sufficient to pay a fair return upon the cost of the plant, and of the organization and establishing of the business.

3. Net revenue can be produced in two ways: by a large percentage of profit on a small business, or a small percentage of profit on a large business. Population, potential business, social and business conditions, generally decide which course will be followed; but with a large population with large potentialities, the experience of all industrial and utility enterprises has been that it adds to the permanency and undisturbed enjoyment of a business, as well as to the profits, if the prices are put at such a point as will create a maximum consumption at a small percentage of profit.

4. Uniform rates for public service must lead to a combination covering a large and diversified territory. No utility is so situated that the same unit of service can be delivered at the same cost over all sections, nor are there in the same system of utilities any two sections in which service can be produced or delivered at the same cost, if each section is charged with its proportion of all costs.

Uniform rates are based on average costs and must be as excessive and unreasonable under certain conditions as they are inadequate and ridiculous under other conditions. When both sets of conditions are under one operation or in one combination, the average applies, and it is a benefit in that it gives equal facilities to all at reasonable prices. When, however, one utility or combination has all the favorable conditions while the other has all the unfavorable—or if a so-called competitor should be allowed to supply under the favorable conditions and avoid the unfavorable ones—rank injustice is done in the one case, while undue benefits are granted in the other. In the one case there are great profits and large dividends; in the other bankruptcy and receiverships, for which the only remedy would be rates for service varied according to conditions, or a combination of all conditions under one operating combination. * * *

A uniform rate is an advantage to the community as a whole, in that it gives to all equal facilities, as near as may be, at a uniform cost; it is equitable in that the highly developed centers are dependent on the country as a whole, and, therefore, should contribute toward this policy of equal facilities at uniform cost; but it is inequitable if, without remedy, any utility is obliged to furnish service below cost at uniform rates established on an average cost which includes utilities more favorably located.

The inevitable conclusion is, therefore, that if uniform rates are to prevail in any utility system, that system must tend to combination and to a single system or monopoly, if you please, if a highly developed, highly efficient, and progressive utility is to be maintained.

5. Where competition in any field is carried on at a reasonable profit it may be the result of agreement expressed or implied, or it may be that observation or experience of the cost, and destruction of aggressive competition, lead to the exercise of a reasonable restraint in the method and efforts of all to increase business and maintain profits. So long as business is above normal or is even normal, it is easy for competitors to maintain prices or to observe agreements; but when business is sub-normal and hard to obtain, while at the same time expenses are constant, charges are continuous, and business at or below cost is better than none, no agreement or understanding, expressed or implied, without penalty, will be long observed.

6. Competition, so-called, in any enterprises carried on at unreasonable profits is, without question, always the result of some understanding or agreement, implied or expressed. Unreasonable profits are bound sooner or later to introduce new conditions and new competitors in any field, whether stationary or growing. It is this that has given rise to the belief in the great virtues of competition.

Little argument is possible here, except in the last paragraph of section 4, which claims monopoly a necessity to ultimate development. And as this is a theoretical discussion, no one will take exception to the statement, for as a theory of service its truth is self-evident. Mr. Vail admits later, indeed, that a local service of satisfactory nature may be given even under competition, because only a certain small per cent of all calls go beyond the boundaries of a single exchange area. Inability to give long distance service theoretically makes for poor service; practically it only reduces service efficiency by the small margin of long distance demand unsupplied. But for perfect service, to the utmost limits of posible transmission, a single system, or monopoly, is necessary; the word monopoly being used in the broader sense and meaning not necessarily one owner or operator, but one network of wires.

Further remarks on competition are interesting:

The vicious acts associated with aggressive competition are responsible for much, if not all, of the present antagonism in the public mind to business, particularly to large business.

We fear, however, that it is the vicious acts associated with the annihilation of competition that are responsible in many cases.

After the settlement of competition warfare:

When prices are restored, even to a normal and reasonable basis, they are in constant contrast with the cut price of competitive war, and the consumer is constantly reminded of the differences and resents them—

in spite of the self-evident fact that the low rates were low for selfish reasons, and would not continue any longer than was absolutely necessary. This is mere human nature. The man who has been traveling on a pass resents having to pay his fare, and denounces the system. It is only within the last few years that service rates have been recognized as mathematical constants—and the calculations for those constants are not yet completed. There are some operators today who are learning that truth with regret; for—

No business can be conducted permanently without some margin over and above the operating expenses, which must include ample maintenance of its plant at the highest "going-concern" standard; while any business can be conducted for an indefinite period, at an apparent profit, at the cost of its plant or its capital depreciation, so long as they last, and after that for some time on receivers' certificates. There may be a temporary benefit to the consumer from unprofitable prices, but in the end prices must necessarily be restored or increased to recoup the losses of the cut prices, and to pay the charges on capital invested in unnecessary duplication, if such capital is not to be absolutely lost to the investor.

Another popular belief is that it is due to competition that prices and charges have been permanently reduced.

Competition may have been a slight stimulant, but permanently reduced prices are brought about by the protection which encourages the inventor to create and develop labor and time-saving machines and new and improved methods and devices; by the desire to gain the profits which reward the study of the wishes, needs, comforts, and luxuries of the world, for the purpose of bettering the existing ones or creating new ones; by the initiative and enterprise which introduced the improved processes and methods; by the introduction of machinery operated by ordinary labor at high wages, to take the place of highly skilled labor at comparatively low wages; by the great increase in the number of purchasers or consumers and by the increase in the average purchasing power of each individual; by the development of markets of such magnitude that large sums could be devoted to the introduction of machinery, processes, and methods which cut producing-cost and enabled a large aggregate profit to be realized on large production and large scales at low prices and small percentage of profit.

Of course, it is evident that if, on a scientific basis, a public utility rate is a mathematical constant, it cannot equitably be either increased or reduced by competition or any other purely arbitrary agent. The only way in which competition could properly reduce rates would be through its action as a stimulant to closer and more efficient management. That it has actually had this effect in many instances cannot be doubted.

The telephone system, however, has not been created without its setbacks, its faults, and its grievous mistakes; and if the experience and knowledge obtained from those mistakes is ingrafted in the present policy of the Bell system, and they are not repeated, too much emphasis should not be laid upon those

ancient and abandoned faults, and the memory should not be too much exercised to recall them from oblivion.

As one reason, but no excuse, for those mistakes, it must be remembered that the telephone was born in an era when it was generally thought that corporations were masters of the public. It is not at all likely from the present attitude of the public that that mistake will ever be repeated.

That is not an apology; possibly it is not even an admission. It is only a recognition of the present fact that the public service corporation is the actual servant of the people, to take its orders, and be governed by its dictates, through its appointed representatives. But—

Unless the public is reasonable in the use of its new-found power, and exercises it justly and equitably, but rigidly and consistently, all remaining confidence will be destroyed, and prosperity will cease; for, unless utilities can be invested in with certainty and security, investment will cease, and growth and development must surely be checked.

THE HOUSEWIFE'S TELEPHONE.

"I DO not agree with those who say order nothing by telephone," a housewife writes. "In many towns tradesmen, grocers especially, every week make special prices on staple goods. I can make a list of bottled or canned goods and save from ten to twenty-five per cent on a purchase of staples. If women would learn the brand of goods preferred and not order or accept a can of cocoa they do not want just because it is cocoa and the clerk offers or sends it, there would be less fault found with goods and the stores soon would learn that you know just what you want. Now, why not order over the telephone? Become acquainted with your butcher and after a few personal calls he finds you know your wants in that line and insist on it and thereafter you will get your goods."

It has been contended that the housewife, thrown off her guard by the ease of telephoning, orders indiscriminately and with abandon, to the later discomfiture of the house master and the distinct advancement of the high cost of living.

But consider the modern emporium of food-stuffs, with its tempting array of delicious comestibles, arranged in pleasing geometrical formations. Consider the blush of the strawberry; the false but irresistible peach behind its red-net cosmetic; the cool and dewy melon; the windowed tins from which peep coyly a vast assortment of attractions, half food, half confection. Consider the shopping housewife, of a bright summer morn, confronted by all these beckoning delicacies. Can she resist their wiles and still retain her smiling self-satisfaction?

Better, far better, if economy be an object, remain at the safer end of a telephone wire.

Numerous attempts have been made at various times to improve telephone service by urging the public to enunciate clearly and not mutter telephone numbers under their breath, and then expect the operator to give the right number. The latest of these attempts, which is as unique as it is senseless, has been proposed by some philanthropic German layman, who suggests substituting the names of vegetables and flowers for numbers. Thus for example, 2 might be equal to beets; 5 = carrots, 8 = potatoes, 6 = violets. He claims that these articles, being well known to the public, will not cause mistakes, as there is no chance of mistaking one for the other. Thus the subscriber, instead of calling for 2568 Orchard, would call for "beets-carrots-violets-potatoes-Orchard."

A Lot of Loaded Lines

It All Depends on Bill.

Says the chief, "The river's rising, and the poles is goin' down;
The conduits is a cavin' in all through the bloomin' town.
So, Bill, get on your slicker and your boots and climbers, too,
And go and get some supper—there's an all night job to do."

Oh, it's Bill this, and Bill that, from morning until night;
If Willie isn't on the job the whole blame works stand still.
Your officers is useful when everything goes right
But when there's trouble on the lines it all depends on Bill.

Says the chief, "Our wires is busted and the people cannot talk,
And we gotta get a line tonight, or take our pay and walk.
So, limber up and grab your stuff and swim the bloomin' creek;
We got a job o' work to do and we gotta do it quick."

Oh, it's Bill this, and Bill that, from morning until night;
If Willie isn't on the job the whole blame works stand still.
Your officers is useful when everything goes right
But when there's trouble on the lines it all depends on Bill.

NEED MORE BE SAID?

[From a "write-up" in the Milwaukee *Wisconsin.*]

Women can handle Waverly electric automobiles with the same facility and safety as men.

"THE SECOND POST."

[Letter received by the Western Electric Company, Philadelphia office, according to *W. E. News.*]

Kindly send me a catalogue containing prices and illustrations of automatic electric registers which I expect to register an electric current or more probably by an electric current much the same as does a trolley car register at least with the same results I would expect it to register once or one whether the current were on for one second or for sixty.

If you have or know of a machine which will do this sort of thing kindly let me know at once.

EXCITEMENTS OF RURAL LIFE.

[Venus correspondence, the Creighton (Neb.) *Liberal.*]

The telephone line is out of commission on account of moring switchboard from Mr. Strope to Mr. Bramens.

GET A MOTOR TRUCK, FOR THE LOVE OF MIKE.

[From the *Youth's Instructor.*]

The following question appeared some time ago in our city paper: "Does a horse push or does it pull its load?" The paper invited answers, with promise to print the best one. I wrote the following answer, which was published:

A lever of the third class has its power between the fulcrum and the weight.

In this case the horse is the power, the horse-collar the fulcrum, and the load its weight.

The horse, which is the power, is pushing or pressing against the collar, which is the fulcrum, and as the load is attached to the collar by tugs, the collar is really the thing that is pulling or drawing the load, by means of the horse pushing the collar; therefore the horse has to push in order to move the load.

YOU SEE, IT WORKS JUST LIKE THIS.

[A Canadian newspaper account of a street car tie-up.]

If there is an electric storm in the neighborhood of the wires, the current on the wire is protected by rotary converters, which transform the alternating current to a direct one. Sometimes the transformers are thrown out of service, and have to be started up again, causing a delay in the systems fed by the power. When this happens, the current is stepped down and out.

HOW BEAUTIFUL THE LAKE IS!

[From the *Illinois Fish Conservation News-Letter.*]

The new method is a secret one, with one or more parents pending.

Mr. Bone is commercial superintendent of the Chicago Telephone Company, but that does not necessarily signify anything. For example, George Brain is a director of the Progressive Telephone Company at Lake Coma, Pa., and we recently added a rural subscriber in M. B. Moo. Then, too, Singleton Bell and Rembrandt Peale are directors of the Huntington and Clearfield (Pa.) Telephone Company. P. H. W.

Interference with High Tension Circuits

By C. A. Buckard*

ELECTRICAL interference between high tension circuits adjacent and parallel to telephone circuits producing disturbing influences in the telephone system, presents an important problem to both the power engineer and the telephone engineer.

The problem is not a simple one and each individual exposure between high tension circuits and telephone circuits requires special treatment although general lines of procedure towards remedying the trouble can be followed. With proper co-operation between the power engineer and the telephone engineer and a certain degree of fairness exercised by both, the troubles caused can usually be eliminated to a satisfactory degree without undue expense to either of the interests involved.

It has long been clearly understood that an electric circuit transmits energy not through the body of its conductors, except to an almost negligible extent, but through the dielectric surrounding the circuit. The conductors are but a guide for energy in its course of transmission through the dielectric. The extent of surrounding dielectric which is energized is known to depend on the voltage, power and electrical constants of the circuit and the geometric disposition of the conductors in a plane

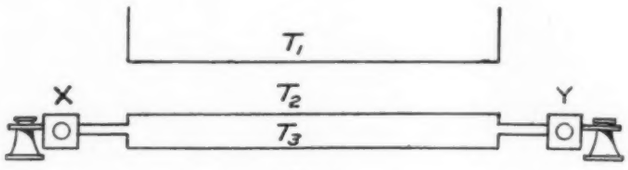


Fig. 1.

perpendicular to the circuit. Modern electrical theory assumes fields of electromagnetic and electrostatic force, as a means of explaining the nature in which the dielectric is energized and also the phenomena of induction. If a foreign electrical conductor lies in these fields of force, any change in the intensity of these fields introduces a voltage or current in the conductor; these being the effects of the phenomena of induction either electromagnetic or electrostatic depending on the kind of field of force in which the conductor lies. Therefore when a telephone system exists in parallel proximity to high voltage or high power alternating current transmission systems there is usually interference in the telephone circuits.

Interference between high tension circuits and telephone circuits is of three fundamental kinds, i.e., telephone circuits parallel and adjacent to a high tension circuit are subject to effects due to electrostatic induction, electromagnetic induction, and leakage. These effects are not separate and independent, but are often mingled in an intricate and confusing way and manifest themselves usually as noise in the telephone receiver.

Under particularly favorable conditions and with all the factors known, mathematical calculations of the induced current are possible. These formulae, however, are not of great value in practice as they neglect insulation conditions of the circuit involved, and it is very difficult to get accurate enough basic data of line characteristics to justify the detail calculations.

Further development of formulae could probably be made for the various combinations of alternating current power circuits and telephone circuits under conditions which might be more or less realized in practice but as soon as one has to deal with more than three or four conductors the formulae become very complicated and are practically unmanageable. Mathematical solu-

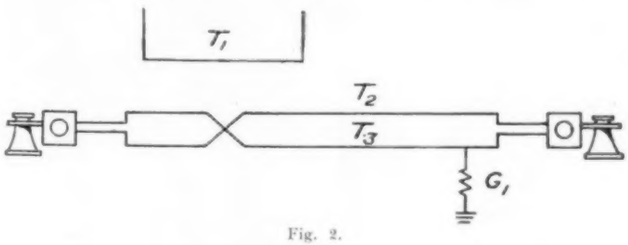


Fig. 2.

tions wholly, involve calculations of capacity and inductance. For telephone circuits this would mean the calculations of split capacities and inductances, that is to say, the capacities and inductances of phantom circuits, and these depend more or less on assumptions as to conductivity of the earth, etc., not actually realized and which are really unknown quantities unless measured. In actual practice we leave such calculations of complex circuits to those who delight more in mathematical exercises than in experimental determinations of values.

While usually none of the factors which tend to produce noise current in the telephone circuit occur separately, it is possible to develop methods of remedying the different factors by considering the effects of each individually.

In general, interference with telephone circuits from direct current circuits is *nil* except in the case of leakage

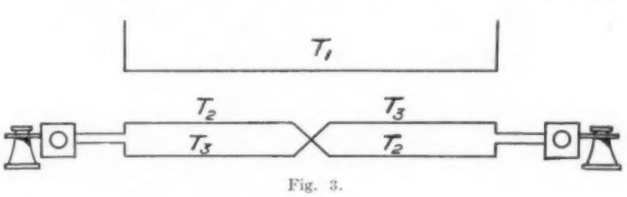


Fig. 3.

from the direct current system. This manifests itself usually as electrolysis of the telephone plant, mostly of the cables, and seldom causes trouble in the telephone circuit except that of a complete breakdown of all circuits when the electrolysis has eaten the lead sheath of the cable and moisture has entered the paper insulation.

Direct leakage from alternating current circuits to telephone circuits is difficult to prove except by seeing actual contact, but frequently, from experience, it seems the only reasonable solution of the intensity and potential of the foreign current which is sometimes flowing in the telephone circuit. Poor construction and low insulation, broken insulators, line wires accidently grounded by guys, trees touching power wires, all coupled with similar conditions in the telephone system make such a

*Canadian *Electrical News.*

condition possible. This condition has existed and has been remedied at considerable expense, by overhauling whole telephone plants. It has caused telephone companies affected to carry a much higher grade of maintenance than would be necessary if a similar high grade of construction was used by the power company. If leakage, i.e., low insulation, exists only on either the telephone circuits or the power circuits alone, the interference is of an inductive nature.

When considering the effects due to induction, whether electromagnetic or electrostatic, one must bear in mind that the whole science of having a perfectly quiet

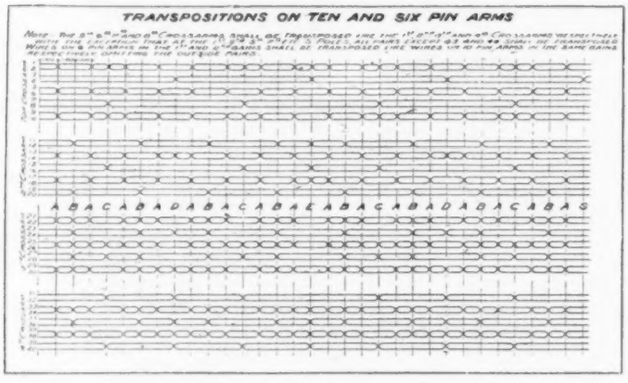


Fig. 4.

telephone line in a foreign electromagnetic or electrostatic field is dependent on the Wheatstone bridge principle, that no current will flow in the wire or instrument connecting two points at the same potential even though these two points are on conductors of considerable magnitude. The practical application of this principle requires that each wire of a telephone circuit shall have the same resistance, the same inductance, the same capacity and the same insulation resistance, and more exactly that these conditions of equality shall hold not only for the circuit as a whole, but for each and every short section of circuit. In practice these ideal conditions can be obtained only approximately but sufficiently balanced conditions can be obtained to make the great majority of the telephone lines commercial.

Electrostatic induction manifests itself both as current in the telephone circuit and as voltage between the telephone circuit and the earth. In Fig. 1 T_1 is a power or high tension circuit. It will induce in the telephone wire T_2 a certain charge, of a potential greater than a similar charge which it will induce in the telephone wire T_3. The differences in charges is due to difference in electrostatic capacity, it being assumed that one wire is farther away from the power circuit than the other, which is the usual condition. Immediately a difference of potential exists in the circuit through the telephone instruments X and Y, and a current will flow attempting to equalize this difference of potential. As the alternating voltage of the power circuit goes through its cycle, so will an induced current in the telephone circuit go through a corresponding cycle, and theoretically 180 degrees in phase displacement from the primary voltage. Without going into the theory of transposition, if the mutual relation of the telephone circuits and the power circuits is changed, that is to say, if the telephone circuit is transposed against the power circuit at the center of the exposure (Fig. 2) the current induced will be reduced to one-half its former value. Theoretically this process may be continued until the foreign current flowing through the telephone is so small that it is negligible. Sometimes when conditions are extremely unfavorable it is physically impossible to introduce sufficient transpositions to reduce the induced current to such a point that a commercially quiet circuit is obtained.

Between the power circuit of Fig. 1 and the ground there exists a potential depending on the method of operation of the power circuits, that is to say, whether one, two or three phase with or without a grounded neutral. According to the theory of equi-potential planes the conductors of the telephone circuit would lie one in one plane and the other in a second plane or perhaps both in the same plane, the exact potential of each conductor above the ground being determined by its mutual capacity with the power circuit and the ground capacity of each wire of the telephone circuit. The potential above the ground which is induced will not cause a serious induced current in the telephone circuit, provided the insulation of the telephone circuit is balanced and the inductance and capacity to ground is balanced and the circuit is transposed properly against the high tension circuit. However, if one wire of the telephone circuit is of low insulation an alternating current will flow, as a difference of potential will exist between the sides of the telephone circuit depending on the leak to ground through the low insulation. This latter fault causes probably a greater portion of the noise current in parallel adjacent telephone lines and power lines than is generally supposed.

It frequently happens that the telephone line adjacent to the high tension line is quiet, that is, it is perfectly balanced, but when this it switched to another telephone circuit which is unbalanced the connection becomes noisy. However, the unbalance in the connecting telephone circuit is not serious for the normal operation of that circuit by itself as this circuit does not lie in the field of disturbance. To illustrate, in Fig. 3 we have a power line T_1 and a telephone circuit T_2, T_3, the exposure between the power circuit and the telephone circuit being only a short portion of the total length of the telephone circuit or connection. Some miles distant at a point G, there is a high resistance ground, that is, low insulation on the wire T_3, causing an unbalanced condition of insulation on the circuit as a whole and

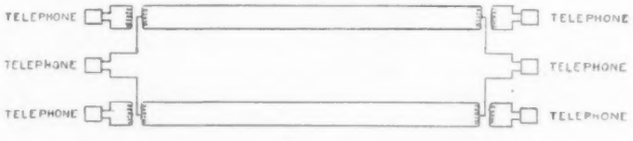


Fig. 5.

hence causing a current flow. These leaks may consist of slight tree grounds, careless bridling of run offs, etc. This sort of trouble may be remedied at the sacrifice of efficiency of telephone transmission by increasing the insulation of the exposed portion, and isolating this portion of the telephone circuit with one-to-one ratio transformers. In telephone practice these are called repeating coils.

In the preceding, attention has been paid to insulation unbalance, but capacity unbalance gives similar trouble and is experienced sometimes in cables, especially in connection with phantom circuits, a description of which is given later.

For ordinary operation, away from a foreign field of force, considerable unbalance can exist in the telephone

circuit and yet service can be given. When a telephone circuit, however, is in parallel proximity to a foreign circuit, these unbalances give trouble and particularly so when these foreign circuits are of a high potential. When a telephone circuit has been finally obtained which is quiet in the vicinity of a power circuit it is in a state of unstable equilibrium as so many slight and unavoidable causes will affect its balance. This condition causes the ones responsible for the telephone circuit to pay particular attention to these circuits and increases the cost of maintenance greatly.

In the preceding, attention has been paid to effects of balance or unbalance in the telephone plant when operating in the vicinity of a power circuit. Suppose under normal operation of the power circuit, with balanced load and insulation, we have obtained a quiet telephone circuit. If anything occurs to unbalance the electrostatic field surrounding the power circuit such as to increase the intensity of that field, the effects are almost immediately felt in the telephone system.

In high tension systems not employing a permanent ground at some portion of their circuit, such as a grounded neutral, any condition of low insulation on any one of the line wires causes practically full line voltage to exist between the other wires of the circuit and the earth. Slight tree grounds, punctured, broken or cracked insulators will cause this. In polyphase circuits unbalanced load conditions will also cause this. As the induced current is increased in proportion to the intensity of the electrostatic field, the telephone circuit perhaps becomes uncommercial wherein sufficient transpositions have been previously introduced such that under normal operation of the power circuit the telephone circuit is quiet. Or perhaps the earth potential of the telephone circuit which under normal operation of the power circuit is permissible, mounts up to sufficient values to operate the protectors in the telephone circuit grounding perhaps one side of the line. When normal conditions again prevail in the power circuit the telephone circuit remains noisy until this ground is found and removed. Thus the telephone circuit may be out of commission a much longer time than the power circuit which has caused the trouble.

While it is realized that any power line is liable to trouble, reliability of service demands that there be a minimum of trouble on the lines. Notwithstanding this there are operating comparatively high tension transmission systems of old type of construction which get into trouble so frequently, and operate under such frequently changing load conditions that it is almost impossible to give satisfactory telephone service in their vicinity.

Electromagnetic induction from power circuits to telephone circuits under certain conditions is a serious disturbing factor in the operation of the telephone circuits. Theoretically a voltage induced in a telephone circuit from a parallel power circuit by electromagnetic induction can be eliminated by a single transposition introduced into the telephone circuit at the middle of the exposure. Considering the laws of electromagnetic induction this can be seen by an examination of Fig. 2. The potential in the portion of the circuit on one side of the transposition will be equal and opposite to the potential on the other side of the transposition, thus neutralizing each other.

It sometimes happens where the power circuit makes use of a ground return, such as a single phase railway or a transmission system employing a grounded neutral through which a strong current flows, that a serious earth potential is introduced in the telephone system due to electromagnetic induction giving rise to effects similar to those described where an earth potential exists due to electrostatic induction. In cases like these, with the exception of a single phase railway, it would appear that it is the duty of the power company to change conditions in their plant such that an earth current does not flow, or else use some means to reduce the extent of the electromagnetic field.

In polyphase circuits employing a grounded neutral, at both the generating and receiving end of the line unbalanced load conditions cause a current flow in the neutral circuit. The obvious remedy is to balance the load which will overcome the difficulty or remove the ground from the neutral. This latter procedure may give rise to increased unbalanced electrostatic conditions which might give trouble. In three-phase circuits employing a grounded neutral an important factor is the well-known fact that the third harmonic of the impressed emf. of the power circuit exists in the circuit of the grounded neutral and possibly the ninth harmonic and still higher harmonics. Induced current of low frequency in tele-

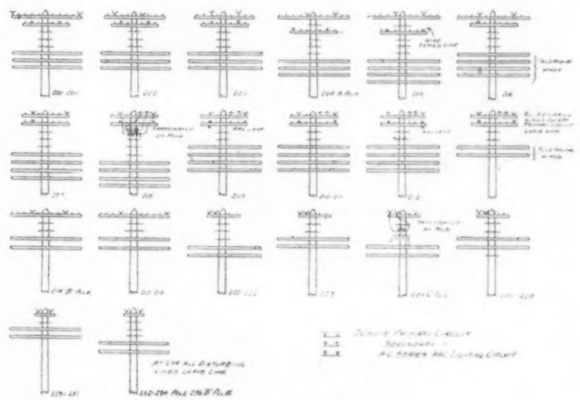


Fig. 6.

phone circuits, such as frequencies of 25 cycles or under, are not as annoying in the telephone circuit as current of higher frequency. Probably the noise of an induced current of 25 cycles would not be noticed by an ordinary telephone subscriber, but any noise from a current of frequency above this would begin to be noticed. From a three-phase system of 25 cycles with a grounded neutral the frequency of the induced current might be 75 cycles or 225 cycles, the noise from which would be distinctly audible. By listening to the pitch of the tone in the telephone receiver connected to the exposed circuit it is often possible to obtain considerable evidence as to the importance of the neutral ground when investigating trouble due to exposures between three phase circuits and telephone circuits.

Certain three-phase high tension transmission systems, by use of the neutral ground make use of the earth as a conductor where a cheap type of plant is wanted, causing a very bad unbalance both electromagnetic and electrostatic. It would seem that this practice in comparatively thickly settled communities should not be allowed as it puts an unreasonable burden on the companies which exist for the transmission of intelligence and who should not be forced to put up an expensive type of construction in order to operate, on account of the extremely cheap method of construction which may be employed

by the company which exists for the transmission of power.

Where it is not possible for the power company to take such steps in constructing its plant, to remove dangerous or disagreeable voltages from the telephone lines due to the method of operation of the power company, there is a method of reducing earth potentials in telephone conductors by a compensator. This is not especially desirable and has serious objections. A compensator is a transformer with windings of such a ratio that when the secondary or secondaries are connected to the telephone circuits the voltage from it is equal and opposite to the voltage induced from the power circuit. A type of this apparatus has been used where the ratio between the primary and secondary windings is approximately unity, the primary being connected to one or more of the telephone circuits which were grounded through the neutral point of transformers. The locations of compensators in the telephone circuit have to be made as a result of special studies of load conditions in

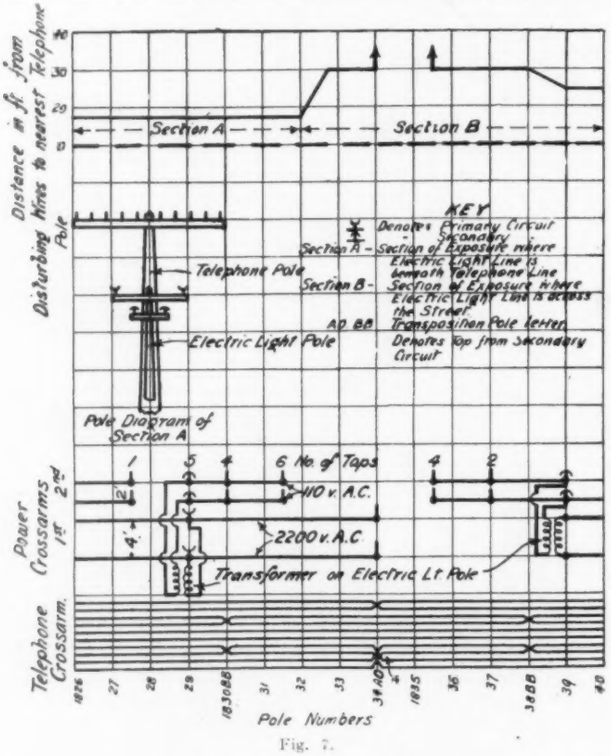


Fig. 7.

the power circuits. This procedure is now recognized as the best available practice when dealing with single phase railway exposures, but requires the use of extra conductors, the burden of expense of which may be considerable.

Another method of taking off potential to ground from telephone circuits is to ground the exposure portion of the circuit by drainage coils. This is a high impedance bridge with the middle point grounded. The connection is such that there is a high impedance path across the telephone circuit to the talking currents and a non-inductive path to ground for the induced or foreign current. This procedure is open to objection as it damages telephone transmission and the apparatus has to be protected with fuses and open space cut-outs which are somewhat difficult to maintain, and there is difficulty in getting good grounds especially in severe weather when a driven ground is liable to freeze. This method has been tried here in Canada with some success towards reducing the voltage to earth and reducing noise but the difficulties stated were experienced.

Other methods of reducing the induced current by reducing the extent and intensity of electrostatic and electromagnetic fields may be used, such as closing up the spacing of the power circuits or of the telephone circuits, or the running of ground wires close to and parellel to power or telephone circuit. The applicability of any of these schemes depends on conditions of exposure which are encountered and has to be the result of study and co-operation between the power and telephone engineers.

While theoretically application as shown in the discussion thus far the telephone circuit can be operated in the vicinity of a high tension circuit the actual application of any method and especially the use of transpositions is complicated by conditions in the telephone plant itself. Where more than one telephone circuit is in parallel proximity to other telephone circuits on the same route, they react inductively on each other producing what is known as crosstalk or overhearing. To overcome this the telephone companies have adopted systems of so-called crosstalk transpositions. For ordinary physical circuits the system shown in Fig. 4 is sometimes used.

Among the ingenious circuit schemes which have been developed in telephone work is the circuit known as a phantom. This really is, however, a true physical circuit, the general idea being given as follows: By a combination of repeating coils, i.e., transformers, it is possible to have three independent telephone circuits on four wires, the scheme of the circuit being shown in Fig. 5. This circuit being a true physical circuit it becomes necessary to transpose this against other similar phantom circuits, against the physical circuits of which it is made up and against other physical circuits all on the same route or pole lead. Systems of transposition to do this have been developed such that the so-called phantom transpositions are superimposed on the system of physical transpositions as given in Fig. 4, and fulfill all the requirements in a very satisfactory manner.

If transpositions in the telephone circuits against high tension systems are to be introduced they should not unbalance the crosstalk transposition system. Just how this is done can best be described by taking up typical cases and how they are treated.

When trouble in a telephone line due to an exposure with a high tension circuit is reported the following information is obtained:—

1. Pole diagram of every telephone pole, such diagram to include:
   - (a) Type of crossarm used;
   - (b) Total number of telephone wires including gauge and pin position;
   - (c) Loading coils, crosstalk transpositions, cable terminals, loops to offices or subscribers;
2. Pole diagram of every pole carrying the disturbing wires, such diagram to include:—
   - (a) Type of crossarm;
   - (b) Total number of wires, type of circuits, arc lights or transformer primaries, etc., and the pin position of the wires of each circuit;
   - (c) Transformers, loops from main line, street arc lamps, etc.
3. In cases of underbuilding or overbuilding or joint line construction the vertical separation of the various cross-arms carrying the wires of each line.

4. In paralleling lines separated by the width of a street the center to center separation of the poles of the two lines.

In Fig. 6 appear pole diagrams which represent the results as would appear in the field book upon completion of a length of line subject to high tension exposure.

From data obtained from the inspection as above outlined the results would be charted similarly to Fig. 7.

On this diagram will be seen, first, the separation of the nearest crossarm of the two lines, pole numbers, location and type of transposition poles, etc., and second, the horizontal spacing of wires of the disturbing circuits; type of crossarm, transformers, arc lamps, etc.

During the inspection as above outlined particular attention is paid to line insulation conditions and all causes of low insulation or insulation unbalance removed from the telephone circuits. This is a primary consideration in all studies of noisy telephone circuits subject to inductive exposure. Resistance unbalance is noted, and steps taken towards its removal. Photographs of exposures are obtained and attached to the report.

In Fig. 8 we have a chart as actually made up for an exposure between a telephone circuit and an a.c. series arc light circuit.

The series arc light circuit is operated from a tub transformer carrying a load of about 50 arc lights. In this arc light circuit no attempt is made to keep the two sides of the circuit together, but one wire circulates over different streets of the town with arc lamps cut in at suitable points for lighting the streets. This way of running the a.c. circuit is probably one of the worst that the telephone companies have to contend with. The series arc light circuit is on the same poles with the telephone wires and with 5½ feet separation.

On the chart the location of the poles is to scale, each large division horizontally being 200 feet. The crosstalk transpositions are shown on the poles designated by a hollow circle. In order to get the best mutual electrostatic and electromagnetic balance between the power circuit and the telephone circuit it is necessary to have the crosstalk transposition points, neutral points in the

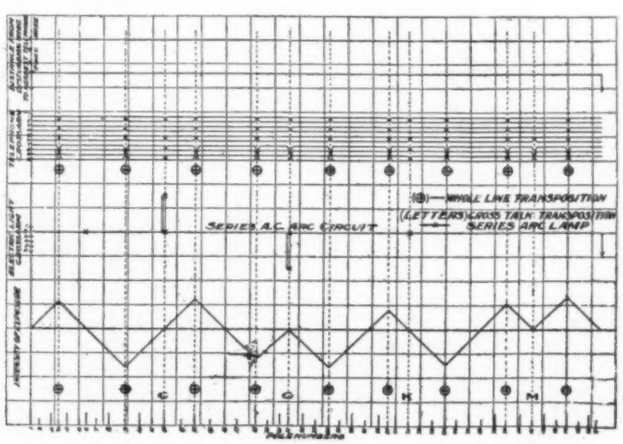


Fig. 8.

scheme of transpositions against the a.c. series arc circuit, that is to say, points where the introduction of a transposition would not affect the balance against the power systems. How well this was accomplished in the scheme adopted is shown in the plot at the bottom of Fig. 8.

The abscissae here represented distance, one large division being 200 feet and the ordinates represent intensity of exposure, one large division representing the exposure of 200 feet of phantom circuit. Where a transposition is cut in, the direction of the induced current

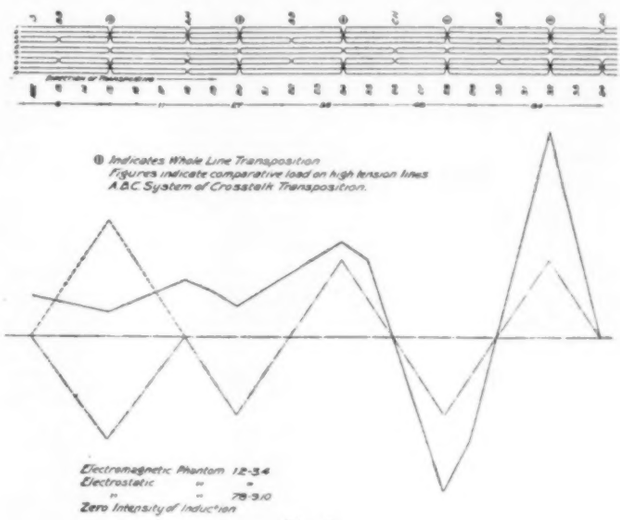

Indicates Whole Line Transposition
Figures indicate comparative load on high tension lines
A.B.C. System of Crosstalk Transposition.
Electromagnetic Phantom 1-2-3-4
Electrostatic " "
" " 7-8-9-10
Zero Intensity of Induction

Fig. 9.

would be reversed, therefore we can say the direction of the exposure is reversed, which accounts for the see-saw apparance of the chart.

The design of the transposition scheme against the power circuit is such that the exposure chart comes out at zero value. This means that electromagnetic induction is entirely taken care of and the current due to electrostatic induction is only that due to about 100 to 120 feet exposure. In the case shown it was possible to neutralize the electromagnetic induction entirely but this would not have been true if it had not been a constant current system. The transposition scheme adopted against the power circuit is shown by following through the transposition designated by a cross circumscribed by a circle. In order to disturb the crosstalk balance as little as possible every circuit is transposed. Thus the crosstalk balance of the physical circuits is absolutely maintained and that of the phantom circuit is only slightly unbalanced.

A portion of the field notes of another exposure are shown in Fig. 7.

The power system was a three-wire two-phase system with the primary divided and one-phase running down different streets on one of which the exposure occurs. The spacing between the primary wires in this portion was four feet straddling the pole.

There was low unbalance insulation in the primary wires and the load was also badly unbalanced as indicated by transformers and transformer capacities, the whole resulting in what appeared to be a strong electrostatic field. The telephone wires were from ten to twenty feet away. The potential in each phase of the power circuit was 2200 volts. Normally such a potential with a separation of ten or twenty feet should not give trouble.

From the field notes the chart in Fig. 9 was made up. A study of the chart showed that owing to the character of the load it was impossible to neutralize both electrostatic and electromagnetic induction. As electrostatic induction appeared to predominate it was decided to transpose mainly for that. The transposition scheme

adopted is that shown at points with designation by a cross circumscribed with a circle. The intensity of electrostatic exposure is shown in the dot and dash line which comes out at zero.

By obtaining values of current strength in different portions of the power circuit it was possible to plot the tensity of the electromagnetic exposure. This is shown by the solid line. The scale of this has no relation with that of the electrostatic induction and probably the total effect was very much smaller.

The load in the power circuit reduced in a direction opposite to that in which the telephone line was transposed, therefore, for convenience the intensity of electromagnetic exposure is plotted from right to left. It will be noted reading from right to left that this comes out with a very small value as compared with maximum condition. Actual tests made after the installation of this transposition scheme verified the correctness of this work.

From the foregoing article it can be clearly seen that telephone companies are put to considerable expense and inconvenience to remedy troubles which are brought upon them by parallelism with high potential power circuits. The best solution of this problem is to keep the conflicting systems as far apart as possible. Where close parallelism is unavoidable some rule for minimum distance for separation ought to be developed depending on the electrical conditions involved. In this connection the following quotation is of interest:—

"We know that electric power circuits may, and occasionally do, interfere with their weaker brothers, the telegraph and the telephone systems. The problem before us now—which is not a problem of interest only to the power engineer or the railway man or the telegraph engineer, but one of great importance to the electrical engineering profession at large—cannot be solved by saying that we are power engineers and expect the telegraph and telephone systems to take care of themselves. This would be as unfair and untenable as it would be for the telegraph or telephone engineers to say: 'We were the first ones in the field and must not be interfered with, and we insist that the electric power systems shall be installed in such a manner as not to interfere with us.'"

This quotations is from Dr. Steinmetz in a discussion of inductive disturbance before the American Institute of Electrical Engineers.

New Bill Divides New York Commission

Following the failure of Senator Fitzgerald of Albany, N. Y., to secure sufficient votes to pass his bill dividing the jurisdiction of the New York State Public Service Commissions over telegraph and telephone companies because of the opposition which developed among the up-state senators a new bill was introduced in both senate and assembly accompanied by an emergency message from the governor.

The new bill, which was drawn by the governor's counsel, gives the first, or New York city, district jurisdiction over all telephone lines entirely within Greater New York and power to fix rates on messages originating in New York to points within the second, or up-state district. The second district commission is to have power to regulate all the wire companies lying entirely within its district and the regulation of up-state rates to points within New York city.

A remarkable feature of the new bill is that both bodies would have supervision over rates between the two districts. According to this arrangement the New York city commission might fix a rate of 75 cents from New York to Albany and the up-state commission one of 50 cents from Albany to New York.

Under the provisions of the bill the second district commission is required to turn over all books and papers relating to telephone matters entirely within New York city to the first district commission and to furnish copies of papers and books relating to business in which both districts are concerned.

Those who oppose the bill argue that if it should become a law it will add large additional expense to the regulation of wire companies by the state because of the necessity of duplicate accounting, inspecting and supervision. The legislative committee recommended that all telephone and telegraph companies be given to the second, or up-state commission, because of the fact that the up-state commission is located at Albany, and that this point is nearer the geographic and commercial centre of the state. It was further urged that the giving of such control to the second district commission would be more economical and that only one bureau of telephone and telegraph and only one corps of inspectors, engineers and statisticians will be needed in that office.

When the bill was introduced in the assembly by Majority Leader Aaron J. Levy it was referred to the rules committee. When Senator Fitzgerald introduced the bill in the senate Senator Walters, Republican, of Onondaga, objected to its immediate consideration, and it was laid aside.

Telephone Situation in Europe

According to the *Revue Pratique de l'Electricité*, France stands much behind both Germany and England in the matter of telephone facilities. In Germany in November last there were about 1,200,000 telephone stations, that country occupying second rank among the nations of the world in this respect, but falling far behind the United States, which is easily first with 10,000,000 stations. France takes fifth rank only with 250,000, being behind Canada with 300,000, and England with about 700,000. The first automatic telephone network installed in Europe was set up at Hildesheim, in Hanover, in 1908, the old system of Strowger being used. At the present time there are 12 networks in operation. The semi-automatic system is also employed, notably at Dresden, Leipzig and Posen. Fresh installations of both systems are under way, the German postal department being very favorably disposed towards them. In France the first trials of these systems are only now being made, the former system at Nice and Orleans and the latter at Marseilles and Angers. As regards the telephone charges, those ruling in Germany are very much lower than what are current in France. They are fixed, not according to population, but to the number of subscribers to a particular network. According to statistics compiled in July last, Berlin, with a little over 2,000,000 inhabitants, possesses 139,428 stations, whereas Paris with nearly 3,000,000 inhabitants has only about 95,000. The equipment installed, both public and private, is about the same in both countries, but the "money-in-the-slot" system is totally unknown in France. The charge in Germany is 0.10 mark (about 1d.), which compares with the 2d. exacted in this country. The use of the slot system is being extended in Germany, it being installed in hotels, restaurants, hairdressers' shops, etc., for the use of their customers.

The Telephone Scrap Book

A Telephone with Fixed Receiver

Desk Telephone with Fixed Receiver.

THE accompanying illustration shows a new telephone with fixed receiver and transmitter for desk service, leaving both hands free, as developed recently at West Haven, Conn. The principal feature of this telephone is that both hands are free while talking, so that a person may call or receive a call and not touch his hands to the instrument.

It was designed by William C. Ude. The instrument may be locked in the closed or talking position for the purpose of holding the wire, or long talks, and automatically releases the latch when the person talking returns to the 'phone and places head to receiver. It is pointed out that another feature of this instrument is right and left hand use of receiver, which is a very simple operation of turning it over to the opposite side of transmitter.

The Old Richmond Switchboard

THE telephone came to Richmond, Va., in 1878, when several Boston men, among them J. B. Orms, J. D. Tracey and D. I. Carson, arrived for the purpose of obtaining a franchise and introducing the new electrical wonder, says W. A. Condit in *The Transmitter*.

The first office was located at Main and Thirteenth streets; it was opened in February, 1878. Twenty-five telephones, many of them experimental, were installed during the initial year. The outside construction took a haphazard course over housetops; grounded lines, of course, were used. The central office itself consisted of a bank of twenty-five call bells, mounted near the ceiling. It had correspondig terminals and jacks, and the bluestone cells and massed wires so dear to the memory of the pioneer.

Operation was a matter of more deliberate action than at present, and history leaves us no standards for speed or accuracy. We dare venture, however, that all subscribers—all twenty-five of them—were receiving "satisfactory" service. To make a call one pressed a button which rang a single stroke at one of these bells in the central office. The operator, or switchman, sat on a bench opposite the bank of bells, and when the signal was received he sauntered across the room, plugged in and chanted the ancient equivalent of "Number, please," into his transmitter, immediately changing the position of that instrument so as to use it also as a receiver. The call received, the caller was instructed to hang up, and answer again when his bell rang. This latter event took place after the formality of calling the desired telephone number and the connection of the two lines with a tie-line.

In 1880 the central office was moved up town to Main and Ninth streets, where improved equipment was installed. Magneto ringing was then added to the system. Later the exchange was moved across the street.

The picture accompanying this article—the one that seems to have stepped out of an antique shop—was taken in 1882, thirty-one years ago, and the subject is not, as might be supposed, a large lamp shade. It is really a telephone switchboard. This board was constructed partly of Western Union switch-panel apparatus, and was set up under the supervision of C. E. McCluer. A point of interest is the galvanometer mounted on top of the switchboard; it served as a visible "busy" signal. At least three of those who assisted in the construction and operation of the equipment are still in Richmond with the telephone company. They are P. H. Sullivan, Wythe White and W. A. Colquitt. Two of the operators shown in the picture still reside in the city.

The "Bell" moved to Grace street in 1902; here, a year later, it combined with the system of the Richmond Telephone Company. In 1902 the first common battery multiple switchboard was installed in the present Madison office. In July, 1909, a second office was opened. In 1912 the Southern Bell Telephone and Telegraph Company of Virginia became the Chesapeake and Potomac Telephone Company of Virginia.

Richmond, Va., Switchboard of 1882.

Records show that in 1890 Richmond had 75,000 inhabitants and 778 telephones; in 1900 the population had

increased to 87,000 and the telephones to 1,947. At the opening of this year, with an approximate population of 160,000 in the exchange area, the telephones numbered 16,072.

Telephoning in Turkey

NOT so many years ago the unprogressiveness of the Ottoman Empire was widely commented on and from the publicity given this condition of national attitude of mind, to some degree the Turk has suffered, says the *Electrical Review and Western Electrician*. It must be conceded, however, that the former sultan was always keenly interested in electrical developments, and, in fact, he was one of the earliest users of the electric automobile, the electric incandescent lamp and the electric telephone. An interesting commentary on this situation in the Turkish empire is the "Societe Anonyme Ottomane des Telephones de Constantinople." Constantinople has worldwide fame are among the advertisers. The rules and regulations contain some interesting paragraphs. For instance:

"Service to be continuous, without interruption, day and night, but the company does not guarantee the continuity of service in the event of force majeure."

"The company will furnish free copies of its directory but does not guarantee the accuracy of its contents."

"Each subscriber's line will have a number and every call should be made by a number. The company has the right to fix this number and to change it at its will."

"The subscribers are required to keep the apparatus in good order and to abstain from any act which might injure it."

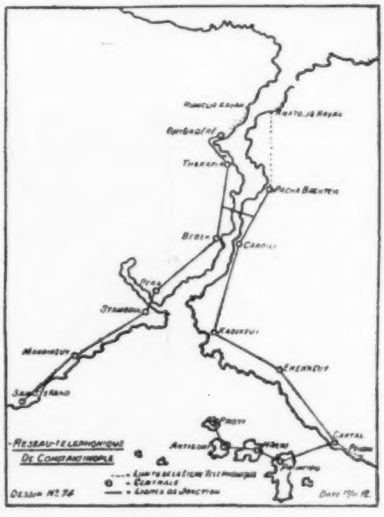
"The subscribers at flat rates must not allow the use of their telephones to any others than their employes or the employes of their families."

The company operating the Constantinople telephone system is a foreign syndicate, which secured its concession from the Turkish government in 1911, in competition with other foreign promoters who wished to enter the field.

If the system is not bought by the government at the end of 30 years, the concession is extended for another 10 years. From the tenth year of the concession the government has the right to buy the system at a premium of from 10 to 2 per cent. At the end of 30 years there is no premium on the purchase price and at the expiration of the 40-year period the price is determined by the amount required to complete the replacement on capital on the basis of a 40-year sinking fund. The government reserves a 15 per cent royalty on the gross receipts.

The company is capitalized for 30,000 pounds. The stock consists of 60,000 shares common, par value five pounds per share.

Front Cover of Telephone Directory.



Map of Long-Distance Lines.

A Page from the Directory.

a flourishing telephone company, with about 2,500 subscribers. The telephone directory of the company is unique and worth careful inspection. It is printed in French and Turkish, and literally begins at both ends. If the local manager of the Constantinople company should tell his advertising manager to go out and sell the inside back cover of the directory he would be in a dilemma, for there is no such thing. As the Turkish language reads from right to left, the Turkish section of the directory begins at what would be the back of an ordinary book, and finishes somewhere near the middle of the volume.

Both covers of the directory bear an Orientalized blue bell of the Bell system, printed, however, in a bright red, with its outlines far from symmetrical. As a matter of fact, it looks like a cross between a bell and a Turkish fez. The book contains about 150 pages, with 2,500 listings. The listings are arranged according to the exchange, number, name, profession and street address. There is also an advertising section with several colored inserts and several American industrial companies of

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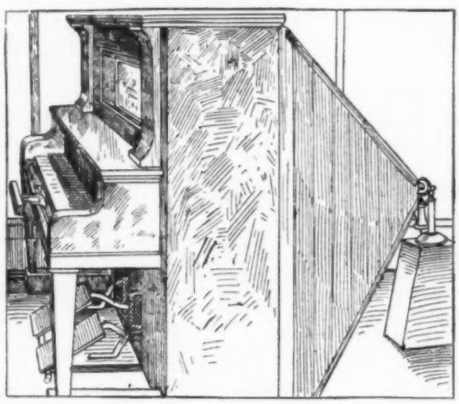
In answer to a question, the postmaster-general recently stated that England's additional treasury grant of £20,000 ($97,400) would probably admit of the provision of about 1,300 additional rural party-line telephones.

Player-Piano Furnishes Music by Telephone

A BRAND new idea for transmitting piano music over the telephone and also an excellent advertising scheme was put into operation recently by J. E. Butler, of the Butler Music Company, Marion, Ind., according to *Popular Electricity*.

A large box board funnel was attached to the rear of a player-piano with the small end connecting with the transmitter of a telephone. At first the arrangement



Method of Connecting Piano with Telephone.

attracted a crowd to the window in which it was located, but later the company began to receive telephone calls from persons anxious to hear the music, and the result is that the telephone and piano are in service from early morning until late at night.

Mr. Butler said: "The telephone manager here was pleased to connect an extra line for our use for the advertising he received from the plan. We advertised in the papers that through the courtesy of the telephone company we had a telephone connected to one of our high grade player-pianos and would be pleased to have anyone call over the special line and hear their favorite selection. Two or three evenings we have one of our men here and the telephone girl calls up party lines to have them listen."

Telephone Exhibit at Panama-Pacific Exposition

THIRTY operators working at one gigantic switchboard, connecting with two thousand stations, is the very attractive exhibit which will be installed by the Pacific Telephone and Telegraph Company at the Panama-Pacific International Exposition at San Francisco in 1915 to celebrate the completion of the Panama Canal.

The switchboard will serve as the central telephone station for the entire exposition grounds, and will at the same time prove one of the most interesting exhibits of "Electrical Methods of Communication" in the Palace of Liberal Arts.

A novelty in connection with the installation which has not been introduced before in exposition stations in that the whole plant will be enclosed in a huge glass case, so that visitors to the exposition may see exactly how a call is made, received and transmitted to the party called.

The manipulation of local and long-distance calls may be watched by the visitor, who will be shown round through the installation by competent guides provided by the company.

The exposition will be equipped with the most perfect telephone and telegraph system that has ever been used in an international exposition. The three main sections of the exposition, the exhibit palaces and gardens, the section for states and foreign nations special pavilions, and the section for amusement concessions will be connected as would different districts of a live city.

The telephone company will pay the exposition a commission for the franchise and the whole system will be conducted as a concession.

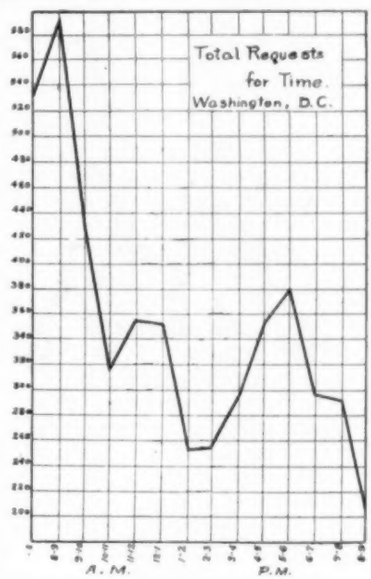
At various points in the grounds, and in every exhibit palace, there will be plenty of public booths for the use of intercommunication and outside connections.

Experts declare that the system which is to be installed for the Panama-Pacific International Exposition will be the most complete and perfected ever attempted at any world's fair.

Significance of Correct Time Calls

THE significance of requests for the correct time in the city of Washington is interestingly demonstrated by the local district traffic chief in a study just completed, says *The Transmitter*.

A graphic chart was made at each Washington exchange, on which was shown the rise and fall of these requests for a period of several days. The figures from which the curves were drawn were then combined and a chart representing the total time calls of this city was made. This curve is reproduced.



Washington's Time Request Curve.

"The peaks of the curve are easily explained," writes District Traffic Cox. "I think the following tabulation shows it quite clearly:

Time of Day.	No. of Requests.	Reasons.
8:00 to 9:00 a. m.	590	Begin work.
11:00 to 1:00 p. m.	350	Lunch.
4:00 to 6:00 p. m.	380	Time to quit.

The commendable fact that Washingtonians are more anxious to begin work on time than to quit seems to be established.

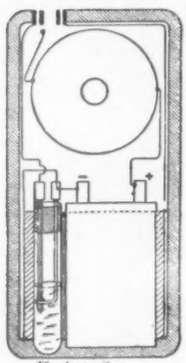
Reduction on Pole Tax Promised

As a result of a communication sent by the Bell telephone people, Conemaugh council, Pa., during a recent regular meeting, instructed Secretary Campbell to send letters to the Bell and the Johnstown companies, promising them that if back pole taxes were paid up by June 1, the Council would consider an ordinance fixing the pole tax at 25 cents a pole yearly.

The Bell people, in their letter, offered to pay up all back taxes at 50 cents per pole if the rate hereafter were fixed at 25 cents. The Johnstown Telephone Company has been charged 50 cents per pole on the street and 25 cents per pole in the alleys.

A Pocket Wireless Receiving Set

THE "radio-pocket" is a compact little French apparatus for taking wireless messages, and is designed especially for amateurs at Paris or elsewhere in France who wish to receive the time signals from the Eiffel Tower. It measures only 3 by 6 inches, so that it can be readily carried in the pocket, according to *Popular Electricity*.



Pocket Set.

It contains an electrolytic detector, a three-volt battery of two cells, condensers and a special telephone receiver. All that is needed is to connect one of the terminals to the antenna and the other to the ground. In dwellings, a wire can be run to any large metal piece such as a balcony, radiator or piping and the like, provided this is not connected direct to ground by metal parts.

Notable Names on the Hawthorne Payroll

A canvass of the employees on the Hawthorne (Western Electric) pay roll has just been completed by the pay roll department, says *Western Electric News*. It presents some interesting and amusing studies in names.

The royal family is represented by three Kaisers, eleven Kings, a Prince, a Knight and a Baron, but only one Castle.

In ecclesiastical circles we find four Bishops, two Pastors, two Parsons and one Priest. There are three Churches, two Chapels, a St. Peter and a St. John.

We have two Bars, but only one Barman; a Beerman, two Beers, a Casebeer and only one Stein. Other tasty names are Port, Kimmel and two Wines.

The geography is peculiar, too. We find one Berlin, one Holland, one Brandenburg, one England, one Paris, one East, one West, one St. Louis (twice), a Montana and a Reno.

In birds and animals we have one Dove, one Eagle, one Duck, one Chicken, one Stork, four Peacocks, one Badger, one Bison, one Buck, two Bulls, three Foxes, six Wolfs and a Moose, but it is not known whether he is of the Bull variety or not.

For those interested in entomolgy the roll offers a Gnat, three Leaches, two Roaches, a Bugg and a Lause.

In the "cuss word" department there is one Damm.

The colors are represented by seven Blacks, eight Whites, thirteen Greens, a Gray, a Pink, a Lavender, a Blue and thirty-three Browns.

Among eatables we have one Apple, two Berrys, three Cherrys, a Bean, a Pickel, three Rices, one Butter, one Bacon, a Wiener and a Wurst. There is a Butcher who can supply the latter, and fourteen Cooks who can prepare it.

There are three Barbers, two of them females; also two Beards.

There is a Rink, two Halls, a Fyfe, two Horns, a Caruso and a Singer.

In noting Fairweather we also see a Cloud. We get a Warning and a Thunder; then three Bolts, one Struck, one Down, a Deadman, a Coffin and a Bier.

We have Money, a Dollar and two Nickels; a Till, a Banker and three Payers; three Bonds, two Stocks, eight Prices and a Sale, a Spieler, a Barker and a Skinner.

There is a Beach at Hawthorne; also a Fountain, a Pond, three Waters, six Wells, two Brooks, a River, two Bridges, a Lake, a Fish, two Salmons and a Fisher.

The roll reveals two Summers, four Winters, Frost, Snow and Ice, nine Bergs and the three arctic explorers, four Scotts, four Perrys and one Amundsen; also a Moon, a Morningstar and Goodnight.

Those who might be of service on the Mexican border are Blank, Sharp, Chambers, Cannon, Kill, Liberty and Garrison.

Agriculture and horticulture are represented by such names as Farmer, Mower, Binder, Grass, Greenfield, Goodpasture, Hay, Stack, Cotton, Ranch, two Weeds, a Marsh, two Bushes, three Woods, Timbers, a Forest, a Palm, a Plant, two Roots, a Lane, a Park, Orchard and Garden, a Bloom, a Leaf, a Flower, six Roses and a Bouquet.

In jewelry we find Silver, Gold, two Medals, two Rings and a Pearl.

Bookworms need no introduction to Longfellow, Emerson, Bacon, Burns, a Hugo and three Rileys.

Among U. S. ex-presidents there are: nine Adamses, two Jacksons, a Madison, a Harrison, six Taylors, eight Pierces, and a McKinley. Of the present cabinet there are twenty Wilsons, two Marshalls, a Bryan and a Garrison. Politically, our White-house is in the foundry.

Then, too, there is a Szcmzyk.

Huh! We don't know. It's all we can do to spell it.

An Early Day British Lineman

ANOTHER historical object is depicted in the accompanying portrait of a Birmingham (England) lineman in the early days. The costume, weird as it may now appear, was not without its redeeming features, for the interior of the top hat could be, and was, used as a receptacle for the tools of his trade. The picture is a reproduction from the British *Post Office Engineers' Journal*.

Ye Olde Tyme Lyneman.

Bankers' Interest in Wisconsin Act

By A. J. Dreher*

SOME time ago, by request, I wrote for publication in the Milwaukee *Journal* an article having a single purpose—that of setting forth in a fair way the effect which the Wisconsin Public Utilities Act as at present constituted and enforced had upon the bonds of Wisconsin public utility corporations. The article was deemed worthy of distribution and was given rather wide circulation in pamphlet form. That article was written for a specific purpose of rather limited import, and in order that I may more adequately state what it is my desire to impress upon you, I have chosen as my subject, "The Bankers' Interest in the Wisconsin Public Utilities Act." What follows is my sincere conviction, based upon a careful study of the law and daily enforced by the peculiar duties of the department of banking activity which I direct. I am fully aware that many diverse opinions exist not only as to the enforcement of the law but even as to its substance, and that in many minds even after the lapse of the time in which it has been in force, there still exists an honest doubt as to its benefit and expediency.

But I believe that all men sentient to the trend of public opinion now admit that one great era in the development of state and nation has passed away forever and another is completely substituted therefor. If any one word may describe the era in which we now function, it may be democratization. I need not call to your minds the varied forms in which democracy has recently expressed itself in statute law and in the minds and consciences of men, for the strenuous political activities of the past ten or twelve years vividly explain to you my meaning. But it was inevitable that a movement so fundamental and receiving so much of its impetus from the abuses, real or fancied, of corporate activity, should do much to directly effect those objects of criticism. Democracy has expressed itself in the field of finance and public utility activity in the form of regulation. The banks of the state and nation for many years past have been under the rules of such regulation and its extension to other fields of endeavor was not an act of unusual concern.

From the period of the Granger legislation in the early seventies, when Justice David Davis of Illinois, in a memorable decision in substance held that the legislative exercise of rate making power came within the constitutional power of legislatures, to the period commencing in 1896, of marvelous commercial and industrial development, when the railroads emerged from a period of financial disaster and obtained a position through consolidation and the masterful, though perhaps not always laudable machinations of E. H. Harriman, which made them the most potent single factor in our industry and commerce, thinking men have been endeavoring to place upon statute books legislation which would in no manner curtail, or repress, the legitimate activities of railroads in the extension and development of their functions, and yet would insure control to the people, within proper spheres, of the highways of commerce, and equal treatment to all in their use.

The early legislation aimed solely at the correction of the abuses arising from discriminatory rates and rebates. But it was inevitable with the great publicity attendant upon this agitation that a wider and keener interest should be aroused amongst men regarding all public service corporations. If the regulation of railroads was a proper function of the state, why not also street railways, gas and electric companies, and telephone companies, all rendering essential service and each having in degree, similar functions? And so from the crystallization of this sentiment there evolved a public service law in this state which has served since its enactment as a model for all others.

In the determination of the value of such a law, four distinct fields of interest must be considered—first, the promoter; second, the public; third, the corporation, and, fourth, the investor.

It is natural and legitimate that he who conceives and carries to completion in the face of many obstacles and after bearing the many burdens and risks inevitable to new enterprises, should feel that the child of his brain and labor should yield to him adequate return in reward. I believe it should. But the definition of the term "adequate" will be the rock upon which opinions shall break, for conflict is inevitable. If it be true as a general rule the era of large profits in the field of promotion of new enterprises impressed with public service is past, then it must be conceded, also, that the satisfaction for achievement will be a smaller margin of profit but a more secure and permanent enjoyment of the completed property, or its reasonable equivalent in money value. Our Public Utilities Act affords this security. By its provisions, and the property laws of the state, public utility properties enjoy, when furnishing adequate facilities, practically unlimited existence. If, however, a municipality should exercise its power to acquire an essential public utility, then it must be conceded that the procedure is fair, and adequate compensation must be paid in return. More than this cannot be asked, particularly as the law now provides that all corporations organized since its passage, shall be subject to its provisions.

As to the public, it seems to me that, viewed from every point, the act is purely beneficial. I need not mention the elimination of discrimination, the increased efficiency of the service, the more adequate conception of a community's needs, or the fixing of a reasonable charge for service, to justify its existence. Any one of these benefits derived from its existence more effectively does that.

A careful study of the enforcement of the law as it directly affects the public utility corporation in its operation is very interesting and extremely valuable. In the state of Wisconsin with a population of approximately 2,300,000, but 752,000 people live in cities of 10,000 population or over. When you consider that this included Milwaukee, with nearly 400,000 people, it may be seen that the greater part of our population is without the limits of the large cities. The significance of this fact is at once apparent. By far the larger number of public utility corporations serving this population operate in small communities where earnings do not warrant the expenditure of large sums of money for expert employees.

*An address delivered before the Wisconsin State Telephone Association at Madison, Wisconsin, February 12, 1913.

Therefore, it logically follows that most of these plants are operated with varying degrees of efficiency by local men. No matter how conscientious managers may be, without efficient methods of operation and accounting the highest development of a plant cannot be reached. By the suggestions given, and by the systems of accounting installed by the Railroad Commission under the authority granted by the uniform accounting provision of the act, changes have been effected which have revolutionized methods of both management and accounting, and have been of inestimable benefit to stockholders, and to citizens dependent for efficient service upon managerial methods of operation and development. As one of the important essentials of business success is efficiency in method, many public utilities owe their development upon a sound basis to the inception and enforcement of this law.

Outside of the public as consumers of public utility service and direct beneficiaries of efficient or inefficient service, there is, if I may use the somewhat imaginative expression, another public with different interests and with keener susceptibilities. Though part of the same great public first mentioned, they are nevertheless to all intents and purposes apart, as they are touched by different interests more personal in nature and therefore more vital. I refer to that class so essential to every nation in its development and to every form of corporate activity, a class rapidly growing in numbers and strength, and therefore in power—the investing public. The amount of capital obligations—stocks and bonds—annually offered for absorption has long since passed the billion mark. Of this vast amount the proportion of public utility securities is annually growing larger. We have seen the 3 per cent railroad bond, the prime security of years past, increase its interest rate by half per cents until today the approximate interest rate is 4½ per cent, with an average income yield close to 5 per cent. We have seen the public utility bond with great opposition fight for a market, for a price, and for ready absorption, and have come to realize that today it is perhaps the most attractive form of bond investment, having behind it the ample security of a property rendering an essential service in a growing community, and yielding to the investor the most attractive interest return consistent with conservative security, upon the market. The period of greatest development in the flotation of public utility securities has been the past six or seven years, the greatest incentive thereto has been the enactment of sound public utility regulation laws.

To be specific, then, how has the Wisconsin Public Utility Act affected the Wisconsin public utility corporations in the pursuit of a sound financial policy for development?

First—It has remedied a franchise situation which gave promise of curtailing legitimate and necessary financial undertakings. The term franchise has been for many years and in many ways a source of trouble. It has corrupted politics and cities, and, when gained, has been of small permanent value to far seeing utility managers planning for future needs and development. Through the indeterminate franchise, long term bonds hitherto unavailable by reason of franchises expiring before maturity, can now be issued, and extensions or betterments not immediately productive of income, and yet capable of great future valut to both company and community, are made available. Take, for instance, the Milwaukee Electric Railway and Light Company, and I am citing this case because of personal connection with it. Its management realized that Milwaukee is soon to be a much greater city than at present, and the cost to the company of improvement necessary to provide for the transportation needs of such growth would involve the expenditure of large sums of money covering a period of many years.

A mortgage was therefore authorized of $90,000,000, securing an issue of general and refunding bonds maturing in 1951. The franchise of the street railway company, however, expires in 1934, or seventeen years before the bonds mature.

Although specific provision has been made in the mortgage for the payment of the bonds in case the term franchise is not renewed, yet such was the confidence placed by the bankers in the ability of the railway company at any time to surrender its term franchise for an indeterminate permit, that no hesitancy was made in underwriting the loan, and the company is thus enabled to provide for its future in a manner hitherto impossible. This is a great factor in the development of a city primarily industrial, and will mean much to the citizens as its limits extend.

Second—It has eliminated what is ordinarily termed cutthroat competition. In one of its sections the act provides that necessity must be shown for the establishment of a competing utility.

This means, briefly, that where funds have been invested in the securities of a public service corporation rendering service in a small community and earning sufficiently to adequately carry maintenance, interest and dividend charges, but incapable if compelled to compete with a similar company of so doing, and thus endangering the margin of safety which the bond holder must have for the interest payment of his bonds, to say nothing of their ultimate payment, that through the advanced and wise provision of the act the bond holder is protected in his investment as never before. Between the corporation in which he is a preferred creditor, and spite competition, there is placed a deliberative body empowered to prevent unnecessary duplication of service and thus give to him and the corporation in which he is interested a security hitherto unknown.

A marked instance of the practical development of this provision occurred in the northern part of the state. A small and prosperous community was being served, not perhaps entirely as all its members would wish, but adequately, with electric service.

The funds with which the plant had been built were furnished through an issue of stocks and bonds taken entirely by local capital. The corporation was meeting interest charges and paying dividends. A faction desired to build a new plant.

From an unprejudiced viewpoint, it was readily seen that such competition would be ruinous to one or perhaps both of the companies. The existing corporation was operating under the public utilities act.

A hearing was held before the commission and not only was the existing company confirmed in its right to operate without competition, but by the expert advice of the commission, a change was made in accounting methods and operating policy which materially strengthened the company's position.

Third—It has furnished a just, adequate and reasonable basis for the issuance of bonds necessary for financing purposes. In this it has performed a tremendous service, for it has affected thousands of people

whose only interest in a public utility corporation is in the stability of its bonded obligations.

Bonds based upon earning power, though reasonably safe, can never equal in security those whose desirability is based primarily upon the basis of physical valuation plus earning power. By the provisions of the act an issue of bonds before marketed must be authorized by the railroad commission. An act precedent to such authorization is the placing upon the property of present physical value, which means not book value nor original cost, but present depreciated value, which is the only sound basis of valuation.

Perhaps the most potent argument in support of the value of such a provision is the citation of an actual case which came within the scope of the commission's activity. In one of the largest cities of the state a dispute arose as to the valuation of a plant rendering public service and which the citizens desired to be municipally operated. In determining upon a fair price a dispute arose as to its worth. The bond holders, seeking only to protect their legitimate interests, based their valuation upon the outstanding bonded debt. The city based its valuation upon the value of the plant as a going concern. The discrepancy in price was natural, but not extraordinary. The commission was appealed to for adjudication.

After impartial examination, it reported that the present depreciated physical value of the property, and the only value upon which the city should pay, was greatly under the amount of outstanding bonds. The problem has not to my knowlege as yet been settled, but in all probability the bond holders will be compelled to compromise at a marked loss. Where funds have been placed in such securities in good faith under such conditions, it is extremely deplorable. With the rapidly growing tendency of municipalities to take over plants furnishing essential public service, it is highly important for the investor to know the actual physical basis of security upon which his bonds have been issued. In this way alone can he be protected against future loss.

And now as to the peculiar interest of the banker in what I have before stated. The banking power of this nation in the past ten years has become the most potent single factor of strength and power in it. Every new enterprise conceived, every railroad projected and operated, every industry which builds up its tremendous organization for the grasping, in competition with the world, of an equal share of the world's commerce, must of necessity enter into relation with the banker. From him the capital which inaugurates an enterprise is obtained, through him its development is financed and to him will ultimately come the burden of loss shall the project prove unsuccessful. Despite many assertions to the contrary, the banking power of the nation is wielded for the general welfare in a patriotic and intelligent manner. The fault of a situation which is absorbing to a great degree the interest of business men in the methods of finance lies not so much in the bankers as in the present system under which they are compelled to operate and which they are intelligently seeking to remedy.

Finance is daily becoming more intricate and by a strange law of opposites is also becoming more universal. America is creating, and creating rapidly, a saving and investing class. It is also true that competition in all classes of business is becoming more keen. Competition is relentless, seeking always to destroy if possible, or if not, to render the competitor harmless to the greatest possible degree. In such a condition, unless methods highly efficient prevail and an impartial adjudicator is ever exerting an influence for justice and reason, disaster is the inevitable result.

It is highly important to the banker that all who desire should have an opportunity to function in the world of commerce, and, in the construction of business enterprise, create more and more wealth. Wealth is the basis of credit, and credit is the foundation stone of business.

The banker also has another responsibility of greater importance than any other, and that is to safeguard without loss the tremendous wealth entrusted to his care. These deposits must earn and must be so placed that the principal shall ever be safe. Clients must also be advised as to safe investments and the investment of funds in enterprises rendering essential service to the community must also be fostered in order that no legitimate enterprise may ever be curtailed from development through lack of necessary funds.

Your business is to bring in instant communication the world of business. The wonders you have worked read like the pages of some ancient romance. The service you have rendered to mankind is inestimable. In efficiency, in largeness of vision, in a desire for greater achievements, you are entitled to the utmost credit. You have become a great social force working for intelligence, development and progress.

The banker of the nation, at least he of the generation now entering upon the stage of activity, feels and throbs with you. He sees the marvels of modern life. He seeks to extend the field of activity in every direction. Every proposition of merit he wants to aid. Every great project conceived in a spirit which makes for the greater power and glory of America he wants to finance.

Out of the conflict has come the great forward strides of history. Conflict is the greater progenitor of permanent achievement. Out of many minds after much discussion came the Public Utilities Act of Wisconsin. Its merits are many—its demerits few. It will need revision and change from time to time as new conditions arise, as from great intensity emerges greater complexity. But it can be changed whenever necessary.

In the banking profession we are concerned with the upbuilding of wealth and prosperity. Any step forward is worth endorsing. A great body of principles, sound in fundamental conceptions, is embodied within the Wisconsin Public Utility Act. It has meant much to this state. It will mean more as time goes by. It has given to one branch of finance a position of stability hitherto unknown. I am glad, indeed, to raise my voice in endorsement of its merit, its equity, and the largeness of vision and efficient service which has made it the great factor for good it now is, not only in this state but throughout the other states of our country.

New England Company's Appropriations Big

Appropriations for 1913 have been made by the New England Telephone and Telegraph Company of $4,500,000 for new construction and real estate and of $5,700,000 for repairs and depreciation. Material progress in business and improvement in working conditions among employees is reported by the president. Net earnings for the year 1912 were reported as $3,468,696, compared with $3,130,802 for 1911. There was a net decrease of $848,992 in the surplus account, but this is explained by the fact that there was charged to the company's surplus $1,000,000 credited to employees' benefit fund and the unamortized part of discount on bonds.

Suit Involves A. T. & T. and Subsidiaries

The relation of the American Telephone and Telegraph Company and its subsidiaries form a target for a suit filed in the Superior Court of Cook County, Ill. The suit is that of equity against the Central Union Telephone Company, the Chicago Telephone Company, the American Telephone & Telegraph Company and certain individuals, William A. Read, Charles J. Spencer and Charles G. Foster, as complainants, the latter being stockholders of the Central Union Telephone Company and holding a minority interest therein.

An injunction against the Central Union Telephone Company and the appointment of a receiver, are included in the bill of complaint. The prime cause of the suit, however, was the alleged intention of the board of directors and the officers of the Central Union Telephone Company to dismember the property of that company which extends its power throughout the states of Ohio, Indiana and Illinois, to dispose of the plant in return for outstanding six per cent demand notes held by the American Telephone and Telegraph Company and the Central Union Company. The sum of this indebtedness amounts to $32,000,000.

The complaint further set forth that the Central Union Company was one of the original subsidiaries of the Bell system which had its origin in 1883 for the purpose of doing business in Ohio, Indiana and Illinois with the exception of certain counties, including Chicago, Cleveland and Cincinnati together with a number of other important cities.

It is also alleged that the parent company withheld the right to transact the toll and long-distance business between points more than one hundred miles apart, within the territory. The sum of $5,450,927 covers the total outstanding capital stock of the Central Union Company, and it is said that the entire capital stock, with the exception of about 2,000 shares, is owned or controlled by the parent or the American Telephone and Telegraph Company. The three complainants claim that, together, they own 829 shares of the stock, which stocks represent an original investment by the owners of $91,000. The contractual relations between the Bell company and its subsidiaries is contained at length in the complaint, including the agreement of 1902 the American Telephone and Telegraph Company received from the Central Union Company, four and one-half per cent of the latter company's gross revenues to cover the rental of transmitters and receivers and the right, generally, to do business under the patents owned or controlled by the parent company.

The Central Union Company has paid no dividends on its capital stock since about 1896 and the outstanding amount of the stock has not been increased. Subsequently $6,000,000 worth of bonds were issued and other financial ventures were effected at various times by loans from the parent Bell Company, the Central Union Company, in return, giving its six per cent demand notes which now amount to $32,000,000. Of this sum, about $10,000,000 is held by the Chicago Telephone Company, the balance remaining in the hands of the Bell Company. Although the bonds issued had not yet reached maturity, they were refunded, recently.

That it was the purpose of the Central Union Company, early during the present year, to sell the tangible assets of the company in the state of Illinois, including franchise rights and good will, to the Chicago Telephone Company for the sum of about $8,900,000 was also alleged by the complainants. This, they added, would defraud them of any returns on their stock. They also state that the management of the Central Union Company has always been under the complete domination of the parent company and that, as a result the minority stockholders have been prevented from participating in their just share of the company's profits.

It is further charged that the commissions allowed the Central Union Company on originating long-distance business and the arrangements for prorating long-distance tolls on messages handled over joint lines have been inadequate and unfair to the Central Union Company. Furthermore, it is alleged that becaue of the control exercised by the parent Bell Company the Central Union Company has been prevented from handling much of the long-distance business which originates and terminates within its own territory and has been unable to make contracts with the parent company on terms as advantageous as would be the case if such control had not been exercised.

The individual defendants named in the bill include B. E. Sunny, president of the Central group of the Bell subsidiary companies and a vice-president of the American Telephone & Telegraph Company; T. N. Vail, president of the American Telephone & Telegraph Company; U. N. Bethell, vice-president of the American Telephone & Telegraph Company, and L. C. Richardson, A. Burt, C. E. Mosley, B. S. Garvey, H. F. Hill, J. Sherwin, C. H. Brownell, E. E. Jackson, L. N. Whitney and W. I. Mizner, directors or officers of the Central group of Bell companies.

In reply the defendant entered a denial to the effect that the parent Bell company never exercised improper control or influence over the Central Union Company; that the contractual relationships between the two companies was just and fair; that during the Central Union Company's early development, the Bell company deemed it wise to retain the right to handle long-distance messages and to build and operate the plant therefor as the newer company was not yet competent to do this for itself; that the four and one-half per cent gross revenues of the subsidiaries received, was but compensation for the various engineering, legal and other services rendered the subsidiary companies by the parent Bell company.

Mitchell Wants Municipal Plant

At a meeting of the city council at Mitchell, S. D., a resolution was passed which calls for a special election to be held in Mitchell June 10 for the purpose of voting on $60,000 bonds for the installation and maintenance of a municipal telephone plant in this city. It is believed that the bond issue will carry without trouble. The franchise of the Dakota Central Telephone Company expired recently, and that company will be operating there without a franchise after that date. As an example to the people, Mayor Hitchcock wrote the telephone company a formal notice ordering the telephones removed at once from his residence and from his office in the Commercial and Savings Bank Building. Should the bond issue carry June 10, it is stated that all work on the new system will be rushed so that the city will be without telephone service but a short time. Meanwhile many phases of the controversy between the city and the telephone company are lying in an undecided state in the federal court.

The Lay of a Layman

By the T. E. Dopester

MEET a telephone man nowadays and he'll sing out, "What's new?" Every mother's son of 'em say the same thing and they mean to convey the idea that there isn't anything new. Suppose there wasn't anything new—would that mean that the business was requiring it? Not by a long shot. The telephone business isn't itching for new things in apparatus. What it needs is a better adaptation of present equipment; a more proficient knowledge of getting the maximum result in traffic. The telephone systems now in use are still subjected to abuse. The men responsible for the management of these systems are too apt to ask, "What's new," rather than to develop their own resources to a higher point of efficiency. For the telephone, be it remembered, is one of those mysteriously contrived, man-made devices that fetches in the sheckles regardless. It produces regardless of abuses. It has wrung the water out of reams of stock and paid dividends in spite of handicaps. Any one with half an eye can see that the telephone will be subjected to still greater demands as we go along. The instrument itself is so nearly perfect that no radical development may be contemplated, but there is need for greater skill in handling the traffic—especially in congested centers. Out in the country, the systems originally installed will remain there as long as anything of the original is left. Then look out for the second-hand stuff going in. The countryman doesn't care for anything that is new beyond this year's model in automobiles or the newest design for a silo. As long as his old telephone does the business, he has no concern. This country problem offers the biggest opportunity in the world for a legitimate promoter. Franchises are still to be had and systems in small towns are hoping for a buyer. The development of a country-wide system is a cinch for those who have the courage to wade in.

* * *

And there is great need for it. The country systems are lagging behind because they require very little attention and their owners in many instances have shifted their energies in other directions. All too frequently you will find that the country system is in the hands of Lizzie, who runs the switchboard, and Bill, who takes care of the trouble, providing it isn't a good day to go fishing. The owner may be the local banker, or the coal dealer. The accounts are sent out quarterly, maybe, and they are paid usually when Mr. Farmer sells his wheat in August or his hogs in October, providing the farmer didn't forget. Out in the country, the telephone business needs some attention from telephone men.

* * *

It is therefore worth observing that the Telephone Service Association is moving into larger quarters and from now on it will hope to contribute very largely in correcting some of the faults of country operating. When men like Vivian and Casey and Uhl and Eldridge get behind country traffic there will be something doing. It is truly wonderful that somebody has awakened to a real need in improving service.

* * *

The receivers for the American Union Telephone Company are asking the court at Harrisburg for $6,000 a year salary. F. D. Houck, Charles West and William C. McConnell received the appointment to act as receivers for the American Union concern three years ago and they have been on the job ever since. As receivers they are entitled to their pay and when you recall that the American Union, before dissolution consisted of fifteen companies, which are now on their respective feet making money, you will agree that $500 a month is little enough wage to pay those men who made the dead come to life. During the term of receivership, the American Union gathered in $3,200,000, all of which went to strengthen the proposition. Marvelous little old telephone instrument, when you find men who know your full worth!

* * *

Last month the court told the Sterling Debenture Corporation it could use the name Metropolitan T. & T. Company. This month the court threatens to put the Sterling crowd in jail if it doesn't stop using the name, which may add to the mystery of a court's decision. The Metropolitan T. & T. Company was the name of the New York Telephone Company in earlier days and it continues to exist because some of the securities were never turned in. The Sterling crowd, or the Telepost crowd—either way around—had been offering bonds in Metropolitan and it was alleged by the New York Telephone Company that the scheme was working an injury to the extent of deceiving the public.

* * *

I see that Grandma Bemis and "Mrs." Belle Esquire and Mrs. W. C. Clickeman have been addressing the Human Rights Party on the subject of the telephone. I shall never know why I dubbed the Professor "Grandma," but he seems to be qualifying right along. The professor is a nickel counter, too, in which he resembles the women in general. He says that the Chicago Telephone Company took in a million three hundred and forty thousand nickels last year in excess messages over the nickel first telephone. He also says that large users of telephone service enjoy a rate of less than a cent a call. By this you will easily understand that the Human Rights Party had an interesting time of it when they met at the Auditorium Hotel a short while ago. It was charged at this same meeting that certain concerns were teaching music via. the telephone and that instruction in German was frequently practiced over telephone circuits. *Konnen sie es uebertressen!*

* *

Word comes from Moline that the Union Electric Telephone Company can't be found. Here's a job for Rufe Holbrook.

* * *

In the matter of rate adjustment, the Chicago Telephone Company is getting a full measure of attention. It has now been discovered that the Michigan State Telephone Company charges the A. T. & T. Company twenty-five per cent for handling the long-distance business in and out of Detroit and other cities in its jurisdiction, while Chicago only gets ten per cent for the same performance. It is alleged that the Chicago Telephone Company collects $900,000 per annum for its long-

distance business, retaining only $90,000 for its share, while the balance goes to the A. T. & T. Company. And because A. T. & T. Company owns a controlling interest in the Chicago Telephone Company, this arrangement will continue regardless of Michigan state's attitude in the matter. But B. E. Sunny is president of both the Michigan and Chicago concerns and a director and vice-president of A. T. & T. and therefore he is asked to explain. Presuming that $900,000 is all the money Chicago collects for long-distance business, the difference between ten and twenty-five per cent as a fee would return to the Chicago company an additional $135,000. E. W. Bemis wants this money for the human rights advocates.

* * *

It has finally been discovered that the National Telephone Corporation of Wheeling is liable for $2,680,000 of debt and that its stock and property is subject to such lien in addition to the outstanding bonds. Charles West should go down there and boost. He knows how to make a system pay and that is about all Wheeling needs. Give a man a chance who knows how and lock up the politicians. The rest is easy.

* * *

The Washington Public Service Commission has had to postpone the hearing brought by the Northwestern Long-Distance Telephone Company that the Pacific T. & T. Company and allies were discriminating by diverting long-distance calls. The postponement was due to the fact that a very material witness is about to become a mother. Here's some punch copy for N. P. Bartley. An automatic system never delays proceedings for such cause.

* * *

The minority shareholders of the Central Union will fuss around till they get somewhere if they are not more cautious. They are now demanding a receiver for the company, alleging that the A. T. & T. through its ownership of stock operates this particular subsidiary to its detriment. The minority shareholders set up the claim that the A. T. & T. will not permit the Central Union to handle calls for more than a hundred miles. It is shown in the affidavits that Central Union with its present equipment might conduct a profitable long-distance business if the parent company would withdraw its present contract.

* * *

Did you get a copy of the *Bell Telephone News* flood edition? There were seventy-two large pages and a cover and there are so many flood pictures that the paper feels wet. Some day you and I will be able to sit down on the banks of the Wabash and figure out why these house organs. But today we don't know. There is a lot of fun in spending your own money, but I can't figure out why the writer's itch will inoculate to the extent that this *Bell Telephone News* depicts. There isn't a line in these seventy-two pages that might not have made acceptable copy for a journal to the trade. There are illustrations galore that would never find printing in any other than a house organ. The press of Ohio and Indiana might have been reached through the regular journal to the trade. The bankers and investors would regard such publicity with greater favor in any other medium than the house organ. When men are great, they prefer that other people tell them so. It gets them farther. If they must tell it themselves we call 'em swell heads. Just so with the house organ. It rises up with splendor at the expense of the house and it tells itself how great it is. Here is seventy-two pages of bunk because the matter is arrayed in a house organ. When the daily press and the people of a flooded district says that the Bell Telephone Company is great, that is enough, unless the Bell wants to say something in acknowledgment through the same daily press or in letters to those same grateful individuals. But to blow a pile of money on a great, big beautiful sheet intended for employes and ostensibly to promote welfare work—oh, I give it up. The only copy I have seen outside my office was pitched under a Rock Island train seat by a disinterested employe. I fished it out. It is a bully book, but it cost too much and didn't get anywhere.

F. H. Bethell Speaker at Luncheon

F. H. Bethell of New York city, vice-president of the New York Telephone Company, was the speaker at the 92nd luncheon of the Albany City Plan Association held at the Hotel Ten Eyck. J. Y. Read, president of the association, presided at the luncheon and Peter D. Kiernan, president of the Albany Chamber of Commerce, who has long been interested in the local telephone situation and through whose efforts the recent reduction in telephone rates, was in great measure procured, was toastmaster.

Mr. Bethell was introduced by Toastmaster Kiernan and was enthusiastically received by probably the greatest number of diners in the history of these noon-day luncheons of the Albany professional and business men.

The speaker gave an interesting outline of the plans of the new 10-story building, to cost $1,000, which the New York Telephone Company proposes to erect on the site of its recent acquired property at the southwestern corner of State and Park streets, Albany. The new home of the company will be a magnificent structure of light stone, cream white brick and terra cotta, the architectural treatment following a Renaissance style. The building will be an ornate structure and of great beauty of design and will be in keeping with the beauty of the surrounding buildings of the state and city. The plans of the telephone company are to make provisions for the telephone requirements which it is estimated this city will need in 1935, when the population promises to be in the neighborhood of 170,000.

Telephone Officials Hosts to Electric Club

The members of the Electric Club of Chicago were the guests of the Chicago Telephone Company at a luncheon, on one of their recent meeting days, through the courtesy of the company's officials. The luncheon was held in the Bell Telephone building and was presided over by H. M. Webber.

B. E. Sunny, president of the Chicago Telephone Company, was the day's first speaker; he welcomed the club into the company's new quarters and talked along the lines of the relation of the telephone to both the office and the home, and voiced his approval of the still growing humanitarian treatment of employees by big corporations exemplifying his own company in the matter of judicious treatment and housing.

The president of the club, George C. Keech, responded to Mr. Sunny's talk and Homer E. Niesz also spoke in the name of the club, thanking the telephone company's officials for the opportunity afforded of inspecting the new building. And then the tour of inspection began, the club members being piloted to every department by guides.

Simple Experiments with Telephone Parts

A Transformer Demonstration

IN spite of all the excellent text-book descriptions and explanations, the alternating current transformer remains a mystery to a great many, even among those who are fairly well grounded in electrical principles. The fact that no electrical connection exists between the primary and secondary coils, and that the current issuing from the secondary terminals is not in any sense the same one that enters the primary wires, is puzzling to say the least. Lines of force and kindred phenomena are all very well from a mathematical standpoint; but one cannot see them. Amateur experimenters, at least, like to have visual demonstration of the operations described so glibly by those who are familiar with them.

Of course, the ordinary induction coil, from the humble "shocking" apparatus to the big wireless wave generator, is really a transformer. In principle at least the operations are identical. The current in the primary winding, which must be alternating or pulsating, rapidly magnetizes and demagnetizes the iron core. These changes, almost like jerks, in the magnetism, generate new currents in the secondary coil. So the primary current must be turned into magnetic lies of force and these lines of force must be turned again into new current. And to make them change the lines of force must move. In a dynamo the lines of force are stationary and the electric wires move. In a transformer the electric wires are stationary and the lines of force move. The only way to make them move without moving some part of the apparatus is to use changing (alternating or pulsating) current.

The induction coil, in practice, is quite different from the commercial transformer. The induction coil uses an open magnetic circuit. That is, the magnet core ends are far apart, so the lines of force must travel from one to the other through the air. The object of this is to get a sharp, quick demagnetization. The

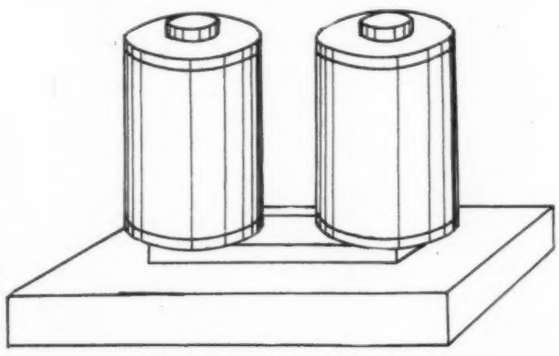


Fig. 1. Electromagnet Mounted for Transformer.

quicker the change in magnetism, the higher the voltage of the secondary, or induced, current will be.

The commercial transformer uses a closed magnetic current. The iron is continuous, and the lines of force simply circulate through it without going out into the air at all, except for a certain amount of leakage. This makes magnetization and demagnetization more sluggish, because there is an easier path for the lines of force and they tend to last longer. They also attain greater strength, and their slower, smoother action generates a more useful current in the secondary windings than is the case with the induction coil.

The induction coil, therefore, will not suffice as a demonstration of transformer action. We must

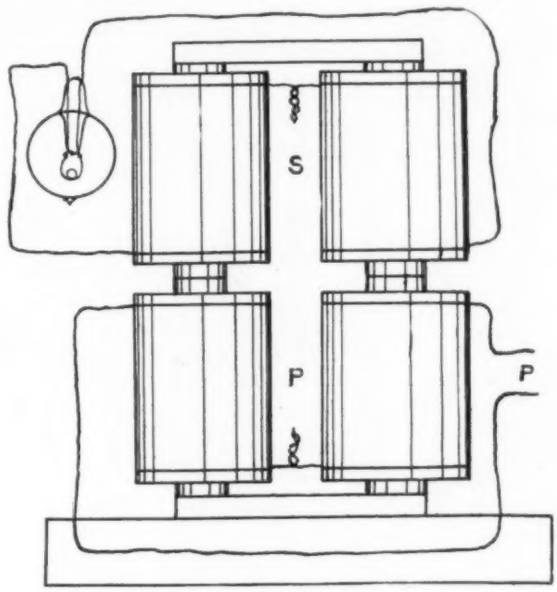


Fig. 2. Simple Transformer.

have an alternating current and a closed-magnetic-circuit transformer.

The simplest and handiest generator of alternating current available to the experimenter is a common telephone hand generator or magneto. These instruments, turned at a comfortable speed, will give current at from 50 to 100 volts with a frequency of about 20 cycles. A cycle is a sort of round trip of the current, since alternating current goes first in one direction and then in the other. And 20 cycles is 20 round trips a second.

The next apparatus needed is two pairs of telephone ringer magnets. The magnets are simply two coils of wire, with iron cores, mounted on a connecting strap or yoke of iron. They are quite similar to ordinary electric door bell magnets, except that their windings are of finer wire and consequently higher resistance. It is not that the resistance is desirable in itself, but that a great many turns of wire must be used to get the full benefit of the generator's rather high voltage. In small coils many turns naturally means fine wire, and fine wire means high resistance.

Having now our two electromagnets and our alternating current generator, we are ready to demonstrate the transformer. It will be convenient, however, first to fasten one of the electromagnets on a small wood base, as Fig. 1 shows it. This, when connected to the generator, forms the primary portion of our demonstration transfer. An exactly similar electromagnet, inverted and placed on top of the first one, with the ends of their cores or poles in contact, forms the sec-

ondary. This arrangement of two electromagnets, together constituting a complete transformer, is shown in Fig. 2. When the generator is supplying alternating current to the primary wires, *P*, the secondary wires, *S*, will deliver enough current to light a small, high-resistance lamp, as for example a telephone switchboard lamp. The demonstration of transformer action

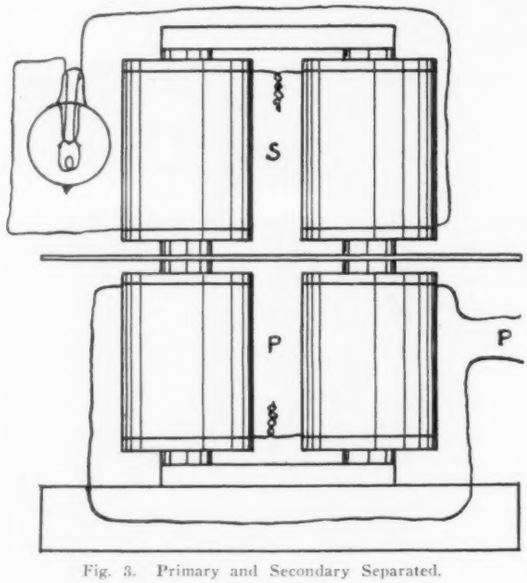


Fig. 3. Primary and Secondary Separated.

is perfect; and the primary and secondary windings being obviously separated, it is apparent at once that the phenomenon is magnetic rather than directly electrical.

To make the action still clearer and at the same time introduce a little of the spectacular, a sheet of paper may be inserted between the primary and secondary magnetic circuits, as shown by Fig. 3. With a strong generator and a sensitive lamp a considerable thickness of nonmagnetic material may be interposed without losing the effect. Interesting observations may be made on the effect of various materials in thin sheets, as glass, iron, copper, etc. Fig. 4 shows a very pretty effect produced with a thin glass tumbler full of water. The fixed primary may be covered with a cloth or paper. The effect of the glowing light, drawing its power from a mysterious source, is very pleasing. In this case, of course, the secondary coils must be waterproofed and rubber-covered wires used.

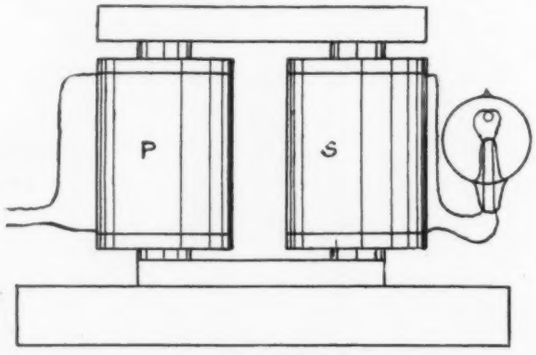


Fig. 4. Simplest Form of Transformer.

The simplest transformer of all is shown in Fig. 5. It is made out of what was the primary in the other experiments. The two coils are disconnected. One coil then receives current from the generator and thus constitutes the primary, while the other coil acts as a secondary and delivers current to the lamp. The closed magnetic circuit is established by laying a bar of iron across the poles. By simply removing the bar the effect of an open magnetic circuit may be tested.

Telephone ringer magnets come wound to several different resistances. Common sizes are 500 and 1000 ohms. Some old series ringers may be found marked 80 ohms. Any of them will do in the rough experimental work described here, although 1000 ohms is rather high, and there would be an advantage in connecting the two coils in multiple, giving a resistance of 250 ohms. And by using a secondary of different resistance from the primary, something can be observed of the principles of "stepping up" or "stepping down" voltages. With such crude apparatus, of course, definite results cannot be hoped for in this direction. But it will be found that a 500 ohm primary and an 80 ohm secondary will give better results with a small lamp than if primary and secondary are equal. Less length of wire on the secondary means lower voltage and consequently more amperage.

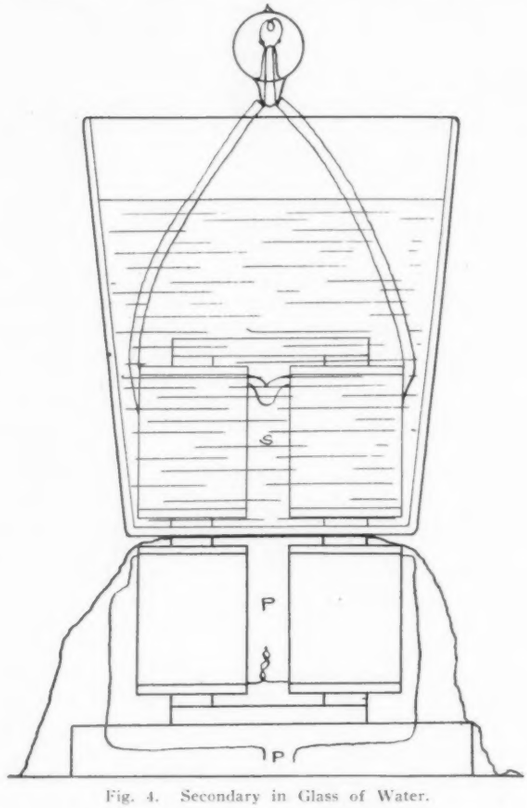


Fig. 4. Secondary in Glass of Water.

New Jersey Commission News

On the ground of lack of jurisdiction the New Jersey Board has dismissed a petition filed by the Delaware & Atlanta Telegraph & Telephone Company appealing from an ordinance of the commissioners of Ocean City, requiring the removal of the company's poles, etc., from the public highways and the installation of an underground system for its overhead system.

Confessions of a Local Operator

By a Shawnee Girl*

GIRLS, did you ever stop to consider how many incidents of interest occur each day, the relation of which would prove advantageous to other operators if we only had (now don't get mad) the industry to make our brains do a little work and record these happenings? We should not have to trouble ourselves about what course to pursue in order to impart this knowledge to each operator, for we have our *Bulletin,* which is always very interesting; but we operators certainly have no share in the credit, and I just think we should be egotistical enough to believe that we can write an editorial if a Chicago girl or a Boston girl does; so let's begin.

As it is well to practice what we preach, I shall abide by this rule and this time, instead of telling you about what happens in my work, I shall give you a glimpse into my career as an operator. Now, before I begin I must ask you not to be critics, for I am not very literary and don't know much about style (I mean style in literature, of course).

I have been working a year, and not until a month ago did I realize that my conscience should have pricked me for drawing salary and doing the grade of work I have been doing to earn it—no, not earn it, for that I have not. Honestly, girls, I don't see how I hold my job. Let me tell you just how I did. Of course—now don't misunderstand me—I did my work sufficiently well to stay in the ring, but I was discontented. Why? Because I never felt that satisfaction that is always the effect of having made an effort to be (in our work we say) efficient. I came to work got there on time—for the reason that it is not always convenient to work double overtime, which is the penalty in our office for being tardy. I know you are thinking, "what is wrong with that? If you are on time, isn't that enough?" But it is not, girls, as I shall show you later.

I entered the operating room, took up my head set, which, by the way, looked as though it had been thrown into the cabinet, instead of the cord having been carefully wrapped about the transmitter, and placed, horn down, into the proper pigeon hole. Inasmuch as the neatness of the force may be judged by a glance at the head set cabinet, it should be kept in an orderly condition.

I marched to the board in my careless, listless way, gazing about as though I were entering a department store looking at ready-made garments, or a beauty parlor taking in the hair dresses, when suddenly I would hear the supervisor say "Miss ....., stand the proper distance from your chair," thus causing a delay and confusion, two products for which an operating room absolutely has no market.

I sat down. The operator whom I relieved had up a connection to a party line; instead of using the phrase for this condition, I went on and rang, ringing the wrong party.

A line signal appeared; I said, "Num, please," with about as much melody in my voice as you could detect in the clown band of a circus. Then I performed one of my pet duties, tapping two, sometimes three, multiples, before I hit the desired number; just too indifferent. This party wanted 99. I repeated f-i-v-e nine. He assented. I rang five-nine. Then two people called the chief operator. One said, "What's the matter with that girl, can't she hear anything? I asked for nine-nine, and she gave me five-nine." The party at five-nine stating, "Now how would you like to come down stairs to answer the telephone and be told it was the wrong number?" Here was valuable time being wasted by three people because I said f-i-v-e for f-i-f-e.

And when folks asked the time, I would give it so nearly correct, that it was necessary for the supervisor to advise me to refer to the clock when giving the time. Somehow I didn't mind furnishing this information, as I would think of some other poor captive waiting to go home as I was.

Girls, what I have told you is significant of every duty I performed; in that haphazard way, wholly disgusted with life during working hours, and not much better out of them, for rest and pleasure not merited can not be appreciated and enjoyed fully.

Now I shall tell you how I do my work today, and I am very happy. Happy at work, did you say? Why, yes, that it is where we spend most of our time, why not make it happy?

Now I get to work on time, because there is nothing more indicative of success than a "rule of life." Have a fixed time for all duties, and nothing will be left undone. Of course the hour for reporting for duty is appointed for you, so your part is to be there at that time, and I want to get to the office in the mornings, for I am anxious to see how much more opportunity I shall have today for improvement than I had yesterday, and the opportunities are surely there if we grasp them.

Now I go to the cabinet, and my head set, which I neatly placed away last evening, is taken out, put on, and when I go to the board I stand one yard behind my chair, waiting for the second tap of the bell.

After taking the position I use my phrases, exactly as they are written, because using one word incorrectly destroys the whole meaning. For instance, in the phrase to be used on calls by name, "I'll connect you with information, she will tell you the number;" if we say "I'll connect you with information, she will give you the number," the patron will take us at our word and expect information to ring the number for him.

I repeat my numbers clearly and distinctly (I have given this special attention), and it is a relief to myself, and I am sure to the patrons, not to have to listen to that nasal twang sing-song I used to get off. I am so very careful about saying f-i-f-e, rolling the "r" in three, that I am not called to task for complaints received from subscribers for receiving wrong numbers and erroneous calls. Do you know there are two more numbers, not mentioned in the rules, which sound alike? They are three and six. The chief operator asked us if we had noticed it, and on being reminded we realized we had; this caused her to tell us something which sounded strange, but it is true, as you will agree. She said, "You will note there is no comment in the book of instructions on three and six sounding alike, but you have found they do; this shows you, girls, that by using your brains

*Pioneer Monthly Bulletin.

(and people seldom suffer from overworked brains), that you have better opportunity for noting difficulties in operating than the officials who wrote those rules, for you have the actual experience, and if you will only show enough interest to make known these difficulties we can bring them to the attention of our superiors, who are broad enogh to consider the suggestions of any of their subordinates."

What was the other imperfection? Oh, yes, now I am so careful about firmly taking that cord plug right on the shell and tapping the multiple of the called nuber twice, and let me tell you how I get that busy test; I get it from the side; you can not miss it or tap the adjacent jack.

I could tell you about innumerable duties, but I have kept you waiting long enough to find out what wrought this reformation. It was this: When our bosses had that conference up at Oklahoma City last month, they decided that the chief operators should have school each day, and you will think as I do today after you have had it, "Blessed work; with it, the development of many efficient operators; without it, many imitations of operators—for that's what I was."

The school was opened by the chief operator at 1:00 p. m., one day in early March. The chief operator in stating the object of the school (here's where my conversion began) told us we could just get out of the notion, if we had it, that they are starting something now to go over cut and dried rules, which will be very interesting, and she told us very frankly we were not doing a satisfactory grade of work; that it was not that we are uneducated, incapable girls, but just lacked sufficient resolution, or perhaps we had forgotten the fact that we are living in the West, for you know the four marks of the cardinal points in this country: in the North, what you know; in the East, what you are worth; in the South, who you are; in the West, what you can do, which to my mind is more than the other three combined. She impressed upon our minds that we live in the West, and that she would personally watch the fulfillment of the mark, which she turned to a slogan, "Do what you can," and if it is lived up to we have the assurance of receiving not only encouraging words as a merit, but a remunerative reward as well, in the form of increased salaries.

We were asked to take a lively interest in this school work, as the company is very generous in allowing us this time; think of it, an hour or more to sit in a comfortable rest room and tell all your operating troubles, and have them remedied just for the telling. Girls, I tell you it is great. The supervisor reads the instructions and the chief operator explains them and asks questions, and we answer them (if we can) and if we don't know the answers we are told and drilled on them the following day, and we ask questions too, and the more we ask and learn the more we think of to ask and want to learn.

Oklahoma Commission News

The Oklahoma Corporation Commission received a complaint from T. B. Haynes, secretary of the Commercial Club of Calera, asking the commission for an order compelling the Missouri,. Kansas and Texas Railroad Company to install a telephone in the depot at Calera.

Complaint was made to the Corporation Commission by the Beaver Telephone Company, Oklahoma City, charging the Fort Supply Telephone and Telegraph Company with resorting to unfair means in attempting to drive out the complainant from operating an exchange at the town of Forgan. The complainant alleges the defendant installed a telephone exchange in Forgan shortly after the Beaver Company commenced operation of its system, and that the defendant is giving service free of charge and that unless the commission prevents such unfair competition, the complainant will be forced out of business.

Ohio Commission News

The Ohio public utilities act seeks to restrain duplication of utility lines only upon the part of companies organized following the passage of the act, according to a decision by Judge Bigger in common pleas court at Columbus.

Companies organized prior to the act's passage may extend their lines.

By his decision, the Farmers' Telephone Company of Shelby County was given permission to extend its lines to Anna, as authorized by the utilities board. The Sidney Telephone Company, a competing company, sought to restrain this extension in the courts.

The Star Telephone Company of Ashland asked consent to issue $67,500 capital stock dividend. It appearing that said capital stock is to be issued and distributed among the holders of the present outstanding capital stock of said company in lieu of the surplus earnings thereof, which might otherwise have been distributed as dividends, but were expended in the construction of additions and extensions to its plant and property, the commission is satisfied that so much of the prayer of said petition as seeks its consent and authority for the issue and distribution of $50,000 par value, of said capital stock as a dividend, should be granted, and it appearing further, that the proceeds arising from the sale of said company's additional capital stock of the par value of $17,500 will be deposited in its treasury as a depreciation fund, the commission is further satisfied that said company should be authorized to issue and sell such additional capital stock for said purpose. It is in accordance with the above findings. Stock to be sold for not less than par. The company is authorized to expend its depreciation fund thus created, or any part thereof, for the purchase of a new switchboard at Ashland, O., and for making additions and extensions to its property and for other proper expenditures for extensions and additions, but thereafter such expenditures, so made, shall not be subject to future or further capitalization.

Michigan Freight Stations to Install Telephones

Representative James Henry's "telephone" bill was passed by both houses of the Michigan legislature without opposition. The bill provides that all railroads in the state supply every freight house with telephones.

"The farmers in the state have become tired of driving several miles to the small stations to find out if their goods have arrived," said Mr. Henry in speaking of this bill. "And in some cases farmers in years past have lost days and days of work in the fields waiting for goods to arrive, having been forced to drive several miles every day to inquire about their supplies which failed to come on time. With the passage of this bill every freight station in the state will be forced to install telephones and this will be greatly appreciated by the farmers and save them much time and inconvenience."

European Telephone Development

By Fred W. Scholz

ALTERNATING CURRENT MACHINE FOR TELEPHONE WORK.

A NEW type of alternating current generator is being used for testing alternating current resistances as met at the frequency of telephone currents. The principle of the machine will be discussed briefly, as it may not be very well known.

The machine is an alternating current generator with two independent armatures which contain the coils in which the a.c. is induced. The emf. is produced in the two armatures by means of a rotating periodic magnetic field, which is excited from the outside. In other words we really have two axially coupled, or synchronous running generators. Fig. 1 shows a cross section of the machine.

The axis of the rotor is vertical in the new machine, although in the old one it was horizontal. The rotor consists of two co-axial, wrought iron hollow cylinders C,C_1, which are connected by the two bronze rings B_1B_2; R_1R_2 are pole rings. Both rings carry the same number of teeth (magnet poles), the outer are placed exactly opposite the inner poles. The annular hollow space between the two iron cylinders C and C_1 and the bronze

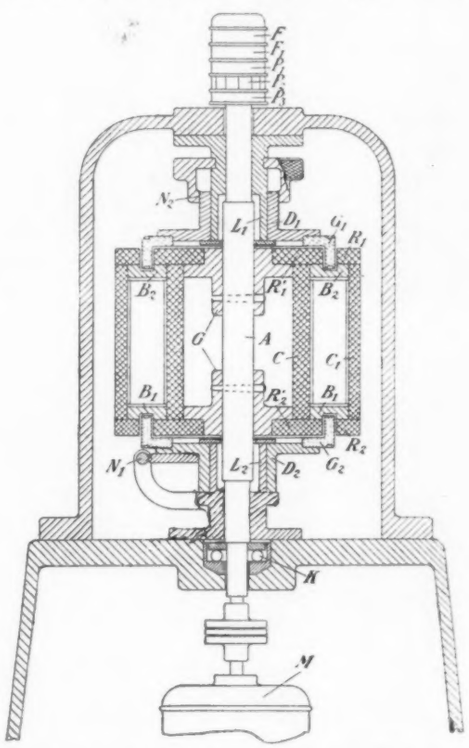


Fig. 1. Cross Section Through A. C. Testing Machine.

discs B_1 and B_2 is filled out by a solenoid, through which the exciter current flows, which magnetizes the hollow cylinders with the teethed magnet poles. The resulting magnetic field between the pole rings R_1 and R_2 is not homogeneous; it is greatest between the opposite lying teeth and decreases gradually up to the greatest air space between the opposite tooth gaps. We can represent such a field by imagining it equal to one composed of a constant magnetic field superposed on a periodic field. The number of periods corresponds to the number of teeth. Into this rotating magnetic field rise two rigid armature rings G_1 and G_2, made of insulating material. Armature G_1 dips between the rings R_1, and R'_1, and G_2 between R_2 and R'_2. The two armature rings carry slots

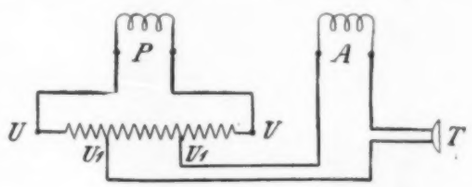


Fig. 2. Diagram for Testing.

in equal spaces on the circumference. Into these slots are fitted the zig-zag shaped armature windings. The rotating field acts only on the parts of the windings running parallel to the axis of rotation. The action of the field is therefore equal to zero, on account of the opposite direction of two windings of neighboring slots. The periodic field on the other hand causes in each winding a periodic emf.; the differences in induced force being about half a period, the force being induced in the windings of two consecutive slots. Since two such neighboring windings have the opposite direction, all the induced forces are added to form one periodic emf., whose period of vibration is n-times as large as the number of rotation of the rotor, since in one revolution every winding passes n-times through a maximum of the field. The armatures are provided with several windings which permit various testing arrangements. The armature G_2 is supported by a bronze support in such a way that it is immovable in the direction of the rotor axis, but can be rotated around the axis in a measurable angle. A rotation of the armature G_2 around say $\frac{1}{2}n$ of the full circle causes a phase difference of 180 degrees of the emf. produced in G_1 when compared to that in G_2. In order to cause any number of phase changes, this bronze piece is provided with the sector of a gear, into whose teeth an endless screw engages. The armature G_1 however, does not rotate around the axis, but can be moved by means of a micrometer screw D_1 in the direction of the axis, so that it can be withdrawn from the magnetic field, whereby the amplitude of the emf. produced is decreased.

For measurements, the diagram in Fig. 2 must be used. P and A represent the two armatures G_1 and G_2. P has a changeable phase, A a changeable amplitude; U, V are resistances of any kind, perhaps a telephone line, T is the measuring telephone receiver. We can now determine the relations of the potential difference between any two points, U_1 and V_1 of the a.c. resistance to the emf. of the armature P in the following way: Through changing the phase of armature P and the amplitude of armature A we silence the receiver T, in other words we cut the circuit ATU_1V_1A out of circuit. Then the potential difference U_1V_1 is equal to the emf. of the armature A. The change of phase between P and

A can be measured, as also the relation between the amplitudes. Consequently the relation of emf. between A and P and also the relation of the potential difference U_1V_1 to the emf. of P are known. The testing of the phase position can be accomplished by connecting armatures P and A in opposition to each other, and silencing the receiver by changing the phase and the amplitude. If we now exchange the ends of P, the receiver will sound again. By changing the phase, it is silenced. The two positions are to show a difference in phase of exactly 180 degrees. In the same way we can test whether changes in phase are present between the different armature windings.

The recent advances of telephone engineering, the necessary testing of Pupin coils, investigations of troubles in telephone circuits, required great constancy of frequency, greater limits of frequency, and an increase in capacity. The latest design of the machine is seen in Fig. 3. To obtain greater uniformity in revolutions, the rotating magnetic body has been considerably enlarged. Instead of the 24 teeth of the old machine, the new one has 40. The capacity at the same frequency was increased, the frequency with the same speed of rotation was increased. The highest possible frequency at present is about 2000 periods per second, equivalent to a frequency of $2T \times 2000 = 13{,}000$. Several changes have been made from the older machine, as in the collector brushes, prevention of slipping between motor and machine by coupling motor and machine axially. The main bearing is ball bearing, the upper bearing of the cylinder type. The friction is minimum as there is hardly any axial pressure. The up and downward movement of the armature is made by a concentrically arranged screw. The new machine is so delicately built that exactly 36 rotations of the screw are needed to change the phase by one complete period. Below the rotor are two hard rubber switchboards, one of which is used to connect the telephone circuits, while the other is used for high tension current for field excitation. The driving motor hangs within the cast iron stand, also in roller bearings. All measurements made with this machine have given accurate results, about which we shall report in a later issue.—*Elektrotech. Zeit.*

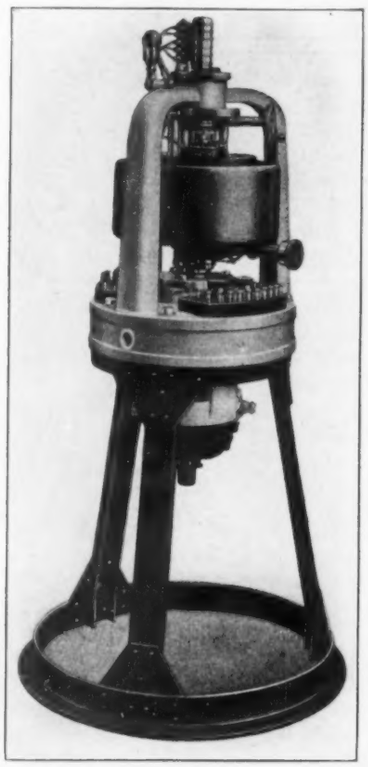


Fig. 3. The New Machine in Its Latest Form.

INFLUENCE OF LIGHT RAYS ON THE TELEPHONE.

O. Gortian in the *Annalen der Physik* brings a summary of investigations made with light rays in their influence on the telephone. He had a pencil of light strike a permanent magnet, in whose interior a coil was placed, whose ends led to a galvanometer. The result was negative. Considering that the rays would probably work if the magnet was of very thin material, he carried on the tests with a telephone diaphragm. Even with the first tests, the galvanometer showed the passing of a current, which results were verified by alternately striking the magnet with the light, and then again leaving it in the dark. The causes for this phenomenon may be various. First of all, we might think of an increase in temperature in the iron membrane, which changed the permeability of the latter. Then again the cause might be found in a slight bending of the thin diaphragm, starting at the edges, and going over the entire surface. This bending effect might be accompanied by some electromotive force. The sources of light were an arc light and mercury vapor lamps. In the tests the rays were distributed according to wave length. The ultra red rays had the greatest influence on the telephone. The effect of the ultra violet rays is very weak.

WIRELESS TELEPHONES IN MINES.

Several Westphalian mines have been working for some time with a system of wireless telephony worked out by Joseph Reineke. This system utilizes the electric difference between the interior of the earth and the earth's surface, and gives to the numerous electric conductors found in mines a static electric charge. This charge is modified by means of microphone oscillations so that it is changed into telephone currents. Spark discharges or similar aids are not used, but the energy of wave vibrations is used directly for speaking. This energy can be received either by connecting to two grounded conductors, as the water pipe line and a rail, or else through either rail or pipe. The wireless telephone has been installed in nearly all of the levels of this mine as also in the hoisting cages. The hoisting cages are in constant communication with the hoisting engineer and inform him whether to stop or go on, and also tell him of the depth. All through the mine the stationary instruments, not larger than a small size suit case, are used for intercommunication. In addition the inventor has designed small portable wall sets that can be connected at any part of the mine to two grounded conductors and are then ready for communication.—*Zeit. F. Schwachstrom.*

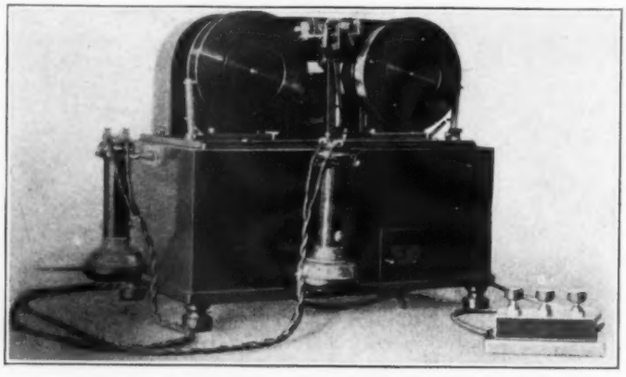


Fig. 4. The Telegraphone of Poulsen.

WIRELESS TELEGRAPHY AND TELEPHONY WITHOUT SPARKS.

A Frenchman, J. Bethenod, has worked on a new

system of wireless telegraphy and telephony that may mean a revolution in that science. His invention does not really cover a new high frequency machine; it goes much further and may lead to important new developments. Whereas up to the present we could not go beyond wave lengths of 10 km. and this only with gigantic antennae, the Bethenod system permits the use of wave length of 30km. and more. In this way it is possible to investigate wave lengths that up to the present could not be studied, and to probably utilize these waves for wireless telegraphy and telephony. For example, assume that an antenna has been built that can send out waves 100 km. in length. Since the speed of electric waves is 300,000 km. per second, the result is that such a wave lasts 1/3000 second, or that the antenna has a frequency of 3000 per second.

To work with such waves, we do not need high frequency generators, but only a.c. machines, such as Bethenod has designed and used in his experiments. The antenna need only be connected direct to these generators. As to further practical use, it is important to note that these new waves seem able to be propagated faster and with less trouble than those used up to the present, so that greater distances can be bridged. Moreover they are not affected by any atmospheric disturbances, since in nature there are no sound waves of similar length that could interfere with them. Sunlight has no influence, either, on these waves, so that they can be sent out equally well by day or night. Finally, the receiver adapted to a certain wave length reacts only to that one wave length, so that there is no danger of disturbance from other stations. The wave length in the new system is absolutely constant, and slight changes have no effect on the operation. Many sending and receiving stations can be installed within any desirable distance, and these will not interfere with each other, as is the case at present. The same station, and as a matter of fact, the same generator can produce waves of different length, so that the station can either speak with several stations at the same time, or else send several telegrams simultaneously to another station. We have then

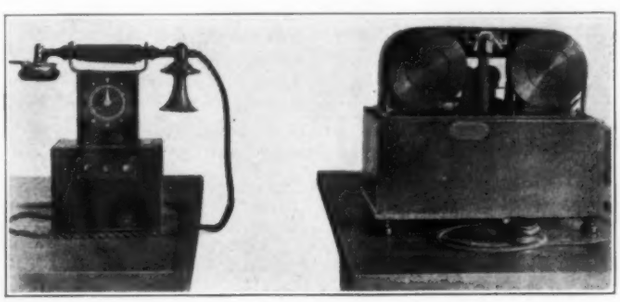


Fig. 5. Dictating Telegraphone.

a system of simultaneous telegraphy, messages being sent at a speed of 200 words per minute.

For the wireless telephone, where we need continuous oscillations of 20,000 frequency, i.e., wave lengths of 15 km., the Bethenod system offers great improvements. The a.c. generator used for this system is a two-phase generator with an arrangement to reverse the one phase before reception of the current at the antenna. Further details are still lacking and will probably be published later on, consequently it is not entirely clear what system Bethenod has used to get his waves. The wave length sent out from an antenna is proportional to the square root of the product of self induction and capacity. There is danger, however, of trouble through antennae radiation in this system. For this reason it has been tried to use the non-radiating, that is, the horizontal upper part of the antenna, although additional trouble

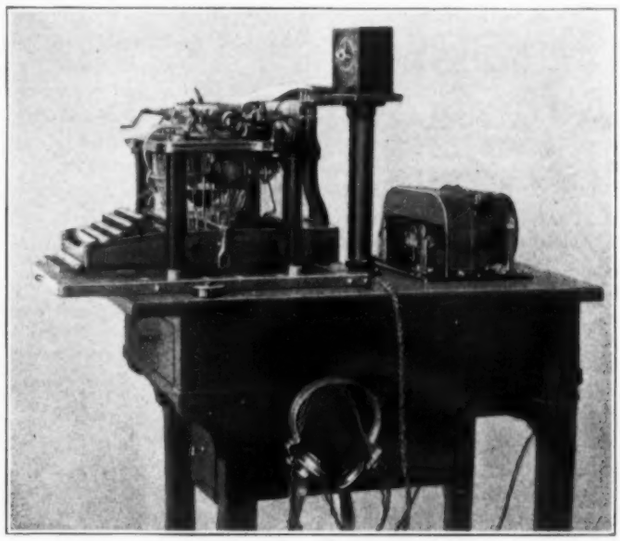


Fig. 6. Telegraphone and Typewriter.

enters. To obtain the right results we would have to arrange the different elements in such a manner that they form the parts of an increasing mathematical series, which converges towards one number expressing great wave length. Bethenod has discovered this method, and can therefore predetermine the various elements for an antenna of any desirable wave length. The mathematical part of his experiment was proved to be successful some time ago, but the practical part of the experiment was only found to be successful very recently.—*Zeit. F. Schwachstrom.*

AN IMPROVED TELEGRAPHONE.

One of the most ingenious uses of the telephone is illustrated in the telegraphone, invented by the Danish engineer, Valdemar Poulsen. The principle is briefly the following: A steel wire is drawn past a small electromagnet at a uniform rate of speed, so that one of the poles glides along the steel wire, while at the same time telephone currents are sent through the coil of the electromagnet. For this latter purpose, the coil is connected to a battery and a microphone. The magnetism induced in the steel wire by the electromagnet changes in harmony with the microphone telephone currents, and along the wire there remains a magnetizing effect which is of the same characteristic as the telephone currents. With the aid of a telephone receiver we can listen to the sounds sent through the wires, by passing the steel wire again past the electromagnet. In the coil, currents are induced by this action, which operate the telephone. If the telephone effect is to be interrupted, the coil is connected to a battery, and the steel wire when passing the electromagnet is, so to speak, magnetized.

Poulsen's co-worker, Dr. Pedersen, has perfected an instrument of the same type which registers two conversations at the same time, using one apparatus only.

First the one conversation is registered by means of a two pole electromagnet, whose two wire coils are connected in such a way that the speaking poles are opposite. When the wires are later connected, so that the poles are like, the first conversation cannot be heard, but the second one can be taken down.

The latest form of the instrument is shown in Figs. 4 and 5. The coils in the front hold about 500 meters of thin steel wire. A small electric motor in the case drives the spool which winds up the wire, so that the wire during running is always stretched. A relay operates and stops the wires. When starting, the spool containing the wire is placed in the left shell, the end of the wire is clamped into the right spool and is then connected to the magnets. There are four of these electromagnets, of which the two first clear the wires of any old dictations, while the two others are used for taking down the dictation. When the apparatus is to register telephone conversations automatically, it is connected as above, and the telephone receivers are hung on the forks. When the apparatus is called up, it receives the messages and runs for about one minute. A new call operates it again for a similar length of time. The wire takes about ten minutes to be unwound from one coil.

Automatic buzzing noises show when the apparatus starts and finishes. When the conversation is to be repeated by the wire, the steel wire is first made to run back on the first spool, and then the two telephone receivers are used to hear the registered conversations. Fig. 6 shows the combination of typewriter and telegraphone.

For taking down dictations and typewriting them, we need a telephone instrument, into which the dictation is spoken and two telegraphones, one for receiving dictations, the other for the typewriter. An indicator shows where the wire is on the spool, and shows by the sound of a bell, when the wire is almost run off one coil. In the above figure, there is also a pedal control arrangement which serves to stop the apparatus or to reverse to go over parts of the dictation not clearly heard. The latest instruments have enough wire to run for 25 minutes. At the recent technical congress in Copenhagen, the telegraphone was used to great advantage. As most of the speakers spoke in a tongue foreign to the native stenographers, each one of the speakers was provided with a telegraphone, which held about 1000 meters of wire on the coils. If the wire of one apparatus was run off, another apparatus was used, while new wire was placed on the other one. It took 40 hours to take down all the speeches, using about 250km. wire. The wires were then given in charge of an expert, who controlled the languages and the technical material, and dictated the translations to stenographers.—*Technische Monatshefte.*

DIRECT-ALTERNATING CURRENT TRANSFORMER.

The aggregate shown in Fig. 7 may be used to transform d.c. to a.c. and is of interest since it is possible with this arrangement to transform current either of the low voltage used in telephone wiring, or else of higher voltages for repair work. The aggregate consists: 1, of a direct current-alternating current single armature transformer with the necessary starter; 2, of a 1/30 h.p. a.c. motor, and 3, of a single phase a.c. transformer. Direct current is supplied over terminal connections *a* and *b*. The current passes through *a* past the resistance which is used as starter.

In the starter the current divides as follows: If we slide the sliding contact from disconnecting position *c* at clamp *d* to the clamp at the end of the wire, a part of the current passes through the field magnets *g* back to the current source (terminal *b*). The other part of the current passes through the resistance, then to the collector (at *e* and *f*) of the a.c. transformer and from there by way of *g* to terminal connection *b*. If we set the resistance for "high" by means of the sliding contact, the field magnet is weakened, and the motor runs faster. But since at the wire end position *h* the resistance is entirely cut out, and the entire current tension is connected to the field magnet, the motor resumes its original normal speed. Consequently the sliding contact should never be left in the middle of the winding, but should be either in the position *c* or *h*. On the axis of the a.c. transformer a pulley for belt or rope drive is fixed, so that the transformer can be used as driving motor, generating about 1/3 h.p. On the armature of this transformer three terminals are placed, permitting three phase a.c. to be obtained. With the aid of the a.c. taken from the slip rings, the a.c. motor is driven, which is provided with a short circuit (squirrel cage)

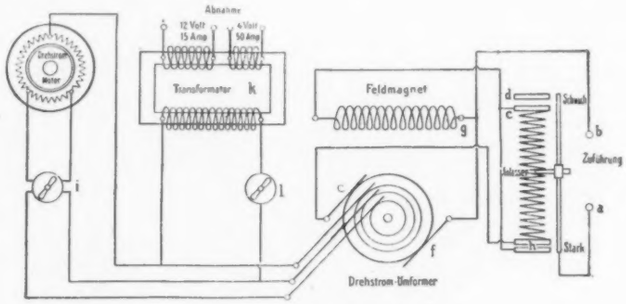


Fig. 7. D. C.-A. C. Transformer Set.

rotor. Into two phases of the a.c. diagram, a double pole switch *i* has been placed, which is used to close the a.c. circuit of the motor. To one phase of the a.c. line a single phase a.c. transformer is connected, which can be disconnected by switch *l*. The primary coil is adapted to the a.c. tension, while the secondary coil varies. Current of about 50 amperes at 4 volts can be obtained, or other current strengths. The transformer set can be used either to supply the current for low voltage lamps, as those used for switchboard work, or else can be used for the ringing current, where a.c. is used. The second arrangement permits the transformation into very powerful currents with low tension, that can be used for various purposes.—*Elek. u. Masch.*

Oregon Commission News

Complaint was filed with the Oregon State Railroad Commission by the Chehalem Mutual Telephone Company of Salem against the Newberg Telephone Company and the Pacific States Telephone Company. According to the complaint the plaintiff asked for long distance connections with the last named defendant, and was advised that it had given exclusive long distance service to the Newberg Telephone Company by contract entered into between them. The plaintiff now alleges that this contract is unreasonable and appeals to the commission for relief.

The Waldport Telephone Company has filed an application with the commission asking for permission to increase certain of its rates.

Who's Who in the Telephone Game

Facts and Fancies About a Man You Know or Ought to Know

YOUR Uncle Hy is a regular fellow. He is now, and ever has been, a telephone man, at least since he was seventeen. And at that he isn't a has been telephone man by a long string of poles. Your Uncle Hy broke into the game in 1897 and will be eligible to membership in the Telephone Pioneers pretty soon, in full accord with its by-laws, but he's a telephone pioneer even so. When you buckle up with the telephone business as far back as '97 and never do anything else day or night, year in and year out, you are apt to catch on to a few of the kinks—especially when you are endowed with three or four van loads of health in reserve and more than enough energy to keep you going. Lest we forget, your Uncle Hy thrives best when you feed him. The more he eats the better he works, and gosh all Friday, how he eats! That's why he is taking on weight. Nobody has ever given him enough of a consignment and he takes nourishment on the theory that some time or another he will have a full pressure job.

A Good Scout.

He started with the Bell—the big school for all the telephone pioneers. His first work was with the Chicago Telephone Company and what he didn't do from '97 till 1901 isn't in the books. Your Uncle Hy is high-strung and as nervous as a bunch of apple jelly. He was always through with his work long before time and would relish all opportunities to help the other boys. A disposition of this kind is the joy of the man higher up, presuming, of course, that the aforesaid m.h.u. knows his business. It often happens that he don't, which is sad for the house and still more sad for the ambitious ones. It took your Uncle Hy four years to break away from the Chicago Tel. He next landed in Baltimore with the Maryland T. & T. Company, but that was a little too far south for him and the gang was a little too slow and the flies buzzed around and around and after a little while he was back in Cleveland with the Century Telephone Construction Company. That was before the Century moved up to the eastern end of Lake Erie. Hy went to the town with present ambitions for sixth place, to create some transmission circuits that would talk to New York. Bert Hubbell has always had that bug, you know, and your Uncle Hy is great when it comes to going a long way from home and talking back. If the circuits won't perform, he fixes 'em up so they will. At Cleveland, after he got his circuits in shape, he discovered that the apparatus itself would bear looking into, especially the transmitters. There was the thing-a-mabob on the arm alright, but it wouldn't work beyond Buffalo or some such distance, so he made a real transmitter that understood, when he talked into it, that the sound was to carry clear out into the Atlantic Ocean if needs be.

About this time, your Uncle Hy wasn't eating as much as he does now. He was tall and gaunt and wild-eyed and in love to beat the band, so he concluded to take a run back to Chicago and kidnap the black-eyed, brown-haired little girl who had crossed his path when her fingers weren't crossed. He did that very thing, too, and the papers said something to the general effect that Hiram Durgy Currier had led Lora Cecelia O'Neill to the altar. And since then Jim has come into the lives of these two. Let Hy tell you about Jim. Or, maybe Jim will tell you, himself. At any rate, Jim is just the dandiest chap you ever saw—a dead ringer for his dad.

However, this is all supposed to be about Hiram D. Currier—a good scout. He's all of that. When he began moving around among men he wore rubber-soled shoes—a real, for-sure, gum-shoe scout for the Western Electric Company. He went back to W. E. in 1903, ostensibly in charge of the circuit laboratory, but he did some soft pedal performances to break the monotony of blue print work. He was engaged with W. E. right along until Frank Chambers found him and suggested an engineer's job with Duplex Metals Company. That connection took Mr. Currier to New York and he lived over in Jersey and went back and forth from the top of the Singer building to his home through tubes and taxis and so forth for quite a spell—until 1910 or thereabouts, when he went back again to the W. E. Company, who told him to toil in the north central portion of Illinois. Mr. Currier has to be told only once. He went at it and after a time there was noise in central Illinois. Come to think of it, your Uncle Hy put all the noise in Illinois, telephonically. The W. E. folks brought him back to Chicago and then the Kellogg Switchboard and Supply Company laid hands upon him. Mr. Currier assumed charge of the K. S. & S.

laboratory and engineering inspection department last September. He likes the place and the place likes him.

H. D. Currier was born at Cedar Rapids, Iowa, April 15, 1880. He attended the public schools at Culver, Indiana, and finished with Chicago's high school at Englewood. His hobbies are nix. Aside from his work, he finds the greatest joy of living with his feet under a table spread with good things to eat—and then he pitches in.

Florida Association Meets

The recent convention of the Florida Telephone Association was one of the most important ever held by the association and the indications are that it will be fruitful of results.

Among the many features of the meeting was the report of a committee composed of George Fernold, Sanford, Fla.; E. E. Voyle, Gainsville, Fla.; Dr. Moore, Tallahassee, Fla.; Ed Scott, Arcadia, Fla.; and W. G. Brorien, Tampa, Fla., which had been appointed to consider the question of rates. A very exhaustive study was made and resulted in the adoption of the following report:

The committee finds no reason to change the rates proposed in its partial report made at the Sanford meeting, which are as follows:

	Res.	Bus.	Party	Res.	Party	Bus.
Up to 250 telephones	.....		$2.00	$2.50	$1.50	$2.00
250 to 500 telephones	.....		2.00	3.00	1.50	2.50
500 to 750 telephones	.....		2.50	3.50	2.00	3.00
750 to 1,000 telephones	.....		3.00	4.00	2.00	3.00

Up to 500 telephones, all extensions wall sets, $1.00; desk extensions, $1.25; above 500 telephones, $1.50.

Local conditions in individual cases may justify a departure from this schedule. Indeed it would be impossible to find a schedule of rates which would meet the varying conditions for all of the telephone exchanges throughout the state.

Memphis Mayor Introduces New Rate Scale

Mayor Crump of Memphis, Tenn., renewed his fight against the Cumberland Telephone & Telegraph Company by introducing into the meeting of the board of city commissioners an ordinance providing a new scale of rates for telephones.

The rates provided in the ordinance are practically the same as those provided in the ordinance which the court of appeals in Cincinnati last year declared unauthorized owing to the then limitation in the city charter. The ordinance introduced follows the passage of a bill in the legislature which amended the charter of the city and gave the board of commissioners the right to regulate the telephone rates.

The new ordinance provides that the rental shall be paid one month in advance. The price for a business telephone under the new ordinance is $5.50 and $4 for a party telephone. Residence telephones will be reduced to $2.50 and party telephones will be $2. The price for extensions will be $1 a month.

The rates are effective upon the final passage of the ordinance. It is expected that the matter will be thrown into the courts immediately upon an attempt to enforce the new scale of rates.

The Pacific Telephone & Telegraph Company has obtained permission from the California Railway Commission to establish an exchange at Placentia. Construction work will begin soon as the necessary material can be placed on the site.

Declare Summer Telephone Rate Exorbitant

Characterizing the rates charged and contemplated by the Michigan Telephone Company for "beach" service as a "graft, hold-up, rank injustice and an imposition against the city as well as those who spend their summers at the local resorts," the Port Huron (Mich.) Business Men's Association cast a die which is expected to influence a marked reduction.

The subject was brought before the business men by President Asman of the association. He declared that he had received two or three communications from persons living outside the city protesting against the present rate and that numbers of Port Huron's residents who summer at the beaches had complained vehemently.

"It was not long ago when telephones were changed to the beach and operated for city patrons during the summer months for no extra charge. Now two dollars is demanded for moving the telephone and $15 is charged for its use. If a man occupies his cottage but one w. during the entire summer and his business connections are such that a telephone is necessary, he is compelled to pay $15. If he remains all summer, the rate is the same. This is an injustice and a rank one. I believe that the Port Huron Business Men's Association and the city of Port Huron should not countenance such graft and that every effort should be exerted to protect local citizens and the hundreds who visit here during the summer."

E. L. Barry, local manager, spoke in behalf of the company. He declared the local rate in no way exorbitant and that after figuring the expense of maintenance, operating and deterioration but a slight profit is left.

Manager Barry then was asked what the rate would be for independent lines when it will be possible to provide them.

"We will charge $12 per mile beyond Garfield street, together with the present rate of $15 per season," he replied.

After being asked to explain exactly what the new rate schedule would mean, Mr. Barry explained that a person living two miles from Garfield street would be assessed $24 mileage and $15 rental, or $39 for the season of four months.

Though they had protested against a charge of $15, assurance that the cost would be more than doubled to a large percentage of the resorters was met with scathing opposition. Immediately it was decided to take the matter before the state railway commissioners and a committee for this purpose consisting of Stephen A. Graham, Charles Sturmer and S. J. Jenks was appointed.

A report from an American consular officer states that a foreign business man desires to be placed in communication with American manufacturers of conduits for carrying underground telephone wires. He is said to be treating with the government, which operates the telephone service of the country, for furnishing a large amount of these conduits. The most modern system will be required. Samples, prices f. o. b. New York, and terms are requested. References can be furnished, and correspondence should be in French, Italian, German or English, the first three preferred.

An automatic telephone system, which was recently inspected by numerous officials of the government of India at Delhi, is to be introduced at Simla next cold weather.

Principles in Telephone Plant Design

By A. H. Griswold*

THE fundamental principles on which telephone plants are designed are, first—to provide satisfactory communication between individuals separated by a definite distance, and second—to provide this satisfactory transmission at a minimum ultimate cost.

A telephone plant may roughly be divided into two broad parts—the long distance lines or the toll system, and the local or exchange system. The design of the toll system as far as physical construction is concerned does not differ materially from the design of any pole line carrying any other utility, except in so far as the telephone transmission is concerned. This problem of transmission is one of the most difficult in the telephone art, and is in itself a considerable problem. Accordingly, I will confine my remarks to the design of local or exchange plants and attempt to give you only some of the basic principles involved.

There is in any city a fairly definite relation between the population and the number of telephone subscribers, and such a ratio will be found to hold fairly constant, with probably a slight continuing increase. Therefore, in laying out a telephone plant, the first thing to determine is the population. This is obtained from past census reports and accurately plotted and extended about 15 years hence, taking into consideration the reasons why the city might or might not grow at a faster rate or slower rate than it has done in the past. As a check, commercial bodies, city officials, officers of other corporations and representative citizens, are interviewed and their opinions obtained. It is probably needless to state that, if a correct answer is desired, it is generally necessary to discount their estimates by a considerable amount. Against this curve of population there is plotted a corresponding curve of growth of telephone subscribers. In this manner a very reasonable forecast of the future development at various future periods is obtained. A map of the city is then taken, and on this map is placed the estimated location of the subscribers in about fifteen years. A fifteen year period is used because this is the average life for the principal portions of the plant, and it is as far ahead as conditions can be reasonably predicted. In making this estimate, it is, of course, necessary to study very carefully each section, each block and often each house or building, and make the best possible forecast as to what kind of business will ultimately be required. In other words, the present and future possibilities are considered. If a manufacturing section is being considered, it will be determined probably that comparatively few telephone lines will be required, there simply being a few trunk lines from some telephone central office to large private branch exchanges. On the other hand, if it is a block in which there are or probably will be located large office buildings, a very high telephone development may be expected. In the same manner, in considering residence districts, the character of the district and of the houses is considered, it being generally known that the larger and better areas use individual lines, while the cheaper areas use party lines almost exclusively.

*Paper read before the San Francisco Electrical Development and Jovian League.

Having plotted the location of these subscribers the next point to be considered is the wire center. By wire center I mean the point at which, if the office is located there, the average length of a subscriber line from the central office to the subscribers' station will be a minimum. This wire center will sometimes fall in the heart of the business district, due to the generally heavy telephone development in that area. Real estate at reasonable prices is, therefore, not always obtainable at the wire center, and accordingly it may prove more economical to establish the central office a little off the wire center rather than to pay an excessive amount for the real estate. In other words, the excess cost of the real estate must be balanced against the distortion in the wire plant. This, of course, can be and is equated in dollars and cents.

We have thus far determined the location of the subscribers within each block, and from that, the location of the wire center or central office. The next point is the consideration of how to bring the subscribers into the central office at a minimum cost. Obviously, it is more economical to carry one large cable from the central office out to a certain district and distribute from the cable to the various subscribers, rather than to bring an individual pair of wires from each subscriber into the central office. The physical conditions encountered in the city, the character of the streets, whether paved or unpaved, etc., are considered, and main backbone routes, providing always a minimum distance to the central office, are established, and a map, or what is termed a fundamental plan, drawn showing these various routes all centering at the wire center or central office. This fundamental plan furnishes the general basis for a continually efficient construction program for any exchange area, so that each step may be based upon the most complete possible understanding of all the available data and the possibilities involved. Whenever any important construction or reconstruction work is undertaken, it is necessary to decide certain questions for which a fundamental plan gives the best information, and if a satisfactory plan is not available it is necessary to base the decision on some of these questions upon an incomplete understanding of the factors and a considerable amount of pure conjecture. Fundamental plans are also necessary as a guidance to prevent the adoption of plant or traffic methods which will prove unsuited to the conditions of a growing system, and the indications of a fundamental plan are often of assistance in considering certain commercial problems. The answer must cover not only the present condition or a short time estimate of growth, but the probable later conditions in order that temporarily cheaper expedients are not adopted with later large losses, due to the fact that the method chosen is not adapted to the growth of the plant. When a business or legal arrangement is to be entered into, binding the company for a long period to certain rates for certain kinds of service, the telephone company should have as good an indication as possible of the probable number and distribution of future subscribers, because these may be so different from the present that a rate which would be remunerative at present would

finally produce too small a net return or even a loss. Such questions as these all can be answered intelligently with the help of a fundamental plan, and if such a plan is not made, the answer must be based on incomplete understanding of many of the factors. These fundamental plans are reviewed and brought up-to-date whenever the growth seems to indicate that modifications are necessary. In general, the period for review is once in about every five years.

Some of the uses of these plans are also as follows:

If you had 25 subscribers in a certain area at this time, and 15 years hence you estimated that there would be 100 subscribers within that same area, you would not place a 25 pair cable to feed that area, because immediate relief would be necessary, nor would you place a 100 pair cable, because that cable would not reach its full efficiency for fifteen years, but knowing the cost of installing cables and knowing fairly well about how that area will grow, you can balance the cost of plant against the growth and determine the economical size and period for the cable to be installed, and very probably you will find that something like a 50 pair cable which will last five years is the economical size.

Again in constructing a central office building, it is economical to build it large enough to care for the equipment for about eight years, and at that time extend the building to care for future periods.

Again in placing equipment in central offices, you ordinarily install enough to last two or three years, and so on for each type of plant.

Therefore, an adequate fundamental plan, together with the estimate of growth of telephones, are used as a guide whenever any important construction is contemplated, and each piece of plant that is added, is placed with a definite end in view and with a knowledge, if the predictions have been carefully made, that it will form a part of the ultimate and economical whole and therefore that minimum ultimate cost will accrue which, of course, is fundamentally essential in the proper design of telephone or any other type of plant.

South Dakota Commission News

The city of Mitchell, S. Dak., won a victory in its telephone controversy, when in a letter to Mayor Hitchcock the secretary of the State Board of Railroad Commissioners announced that the board has deferred all action on the question of rates in iMtchell for a period of 120 days, and ordered the Dakota Central Telephone Company, if it continues to do business in the city, to use the rates now in force for a period of 120 days from May 11. The commission, which was asked by the telephone company to establish the new rates, which average about 50 cents higher than the ones now in force, declares that it is not a party to any of the litigation now pending before the courts in the telephone controversy and states that it will be unprejudiced by any controversy or any ruling it may make.

Telephone cases occupied much of the attention of the South Dakota Board of Railway Commissioners at its last regular meeting. In complaint No. 1319, Charles Nelson made a general charge of discrimination against Steninger Telephone Company and others in Turner County, which are so constructed that interconnection is made between all of the lines. So-called "free exchange" of service existed between some of the companies, but not between all of them. The Steninger Telephone Company made a ten cent charge for the use of foreign lines. Some of the other companies exact a ten cent fee (in some cases the fee was from 20 to 25 cents), and there were situations where certain companies required a fee for talking over some foreign lines and not for talking over others. This situation has created considerable unrest, and the complaint was brought not against any particular practice, but with a view to bringing out a general investigation. All the telephone companies were represented and offered testimony. The decision reviews the sections of the telephone law applicable to the situation, and shows that section 8 expressly provides for the interchange and switching of messages for a reasonable compensation and without discrimination, and fixes a maximum charge of 25 cents per month for switching for each instrument on any rural party line. The opinion says: "In cases of this kind where the action of the board is of such great importance to all telephone companies doing business in the state a well defined scheme of regulation should be outlined which may be relied upon as a precedent by the telephone companies and the public which will promote the efficiency of the telephone service, and the convenience and accommodation of the public."

Wisconsin Commission News

The La Crosse Telephone Company and the Wisconsin Telephone Company have been ordered by the Wisconsin Railroad Commission to make a physical connection between their toll lines or systems. The expense of making the connection and the subsequent maintenance is apportioned equally upon the companies.

The decision is a very important one. It is one of the first contested cases of its kind to be brought before the railroad commission since the passage of the physical connection law two years ago. It is said by telephone men at Madison that the case will be appealed to the supreme court and if beaten there it will go to the United States Supreme Court. The commission gives the companies thirty days to comply with the order. The decision says:

> Notwithstanding the contention of respondents that the statute transgresses certain constitutional guarantees of property rights, it was manifestly framed with great care, and with a view of protecting the utilities in the enjoyment of all of their rights and privileges, while at the same time compelling an involuntary enlargement of the use of the facilities when necessary and required for the public welfare. There is nothing in the letter or spirit of the law that savors of confiscation, and if administered according to its obvious intent and purpose, no property rights will be impaired and no injury inflicted upon anyone. That great difficulty will be encountered, in certain instances, in prescribing such terms and conditions upon which the connection shall be made, as will safeguard the rights and interests of all concerned, is evident to everyone conversant with the complexity of the situation presented by the numerous competing and conflicting telephone utilities now engaged in serving the public with their facilities and disturbing its tranquillity with their strifes. But mere inconvenience in the application of the terms of a statute to the facts of some intricate case that may arise is not a ground for invalidating the statute. Some constitutional limitation or restriction must be violated by the provisions of a statute before legislation can be set at naught. The act here under consideration is, in our judgment, free from the imputation of such infirmity.

The decision argues that the earning power of the Bell company will not be disturbed by the making of the connection, because the subscriber of one company desiring toll service over the lines of the other company must pay in addition to the rate charged the patrons of the latter company a reasonable compensation for the additional service.

Talks on Law; Signing a Note

By Walter K. Towers*

ONE noon, while Jason Edwards was sitting on the porch of his prosperous farm home, resting before he returned to the fields, a shiny top buggy drawn by a long-legged bay drew into the side yard and a brisk young man descended. He presented the card of the National Silo Company, and solicited an order. Mr. Edwards needed a silo and signed an order for one, to be erected later. He read the order carefully and noted its contents. It clearly read as an order for a silo, for the erection of which, if completed within sixty days after date, he was to pay $100.

No silo appeared, nor could Mr. Edwards locate the company, but he saw nothing to worry about until, sixty days later, a near-by bank presented to him for payment a note for $100 in regular form and bearing his signature. He protested that he had signed no such note; yet acknowledged that it was his signature. Examination showed that it was one end of the silo order he had signed. It had been so worded and arranged that one end might be cut off, leaving a promissory note in regular form. The bank insisted that it had paid full price for a regular note and as it was a "negotiable instrument" it was protected as a *bona fide* holder. Edwards sought advice, and, being told that he would have to pay the note, did so.

Proper advice by a competent attorney would probably have saved Edwards' $100, since few states will support such a note, signed under such circumstances. True, if one is induced to sign a negotiable promissory note through fraud and that note is sold in ordinary course to a bank or individual, the purchaser accepting it in perfect honesty and good faith, paying full value for an apparently regular instrument that is not yet due, the quality of negotiability is such that the purchaser will have better rights than the rogue who transferred it. Indeed, under such circumstances, the signer would have to pay the note. But rightly viewed, the case of Jason Edwards is not such a case. He was not induced by fraud to sign a note, because he did not sign a note. What he signed was an order. Having never signed a note, but something entirely different which was changed into a note, he is no more liable than if his signature was forged to a regular note. Yet it is not strange that many laymen have confused this rule and suffered needlessly when some of our courts have made the mistake.

The other side of the picture is the fraud practiced on Allan McGoorty and his wife. Again a buggy came down the road, but it was driven wildly by an attractive young man, and to his arm clung a young woman. They paused at the hospitable looking house for refuge and told of eloping from a cruel father. Now, all the world loves a lover, and the McGoortys were all assistance. Opportunely, quite by accident, of course, a clerical looking gentleman appeared from the other direction. Yes, he would marry them, and did—at least, he went through a ceremony. Of course, the bride wept, so did Mrs. McGoorty, and Mr. McGoorty blew his nose and found his eyes a bit dim. In the confusion the "Reverend" remarked that the witnesses must sign a certificate and pushed a paper toward them, which they readily signed.

Three months later a bank produced the "marriage certificate" for payment. It was a regularly drawn note for $500. McGoorty had to pay it, as he was legally liable. He had committed the fault of failing to read what he signed. In his case he actually signed a note. Of course, neither the "Reverend" nor his confederates could have collected from the McGoortys, but they had negotiated the note at the bank, which, having nothing to arouse its suspicions and knowing McGoorty's signature, purchased it for full value, whereupon the "Reverend" and his friends moved on to try their scheme in virgin soil, taking care to be well away when the notes fell due. Where one of two innocent persons must suffer, the law takes the view that the one who by his carelessness made the fraud possible must foot the bill.

A similar result followed in the case of Clarence Tucker, who purchased and accepted a barrel of medicated calf meal, giving his note for $10 therefor. The bottom two-thirds of the barrel proved filled wth sawdust, but by that time the bank had purchased the note and the agent had vanished. Tucker was legally bound to pay the note. The vendor of the meal could not have recovered the sum, but again the quality of negotiability protected the innocent purchaser, and the man who signed the note had to pay it. He had signed a note, and it having come into the hands of an innocent third party in due course of business, his liability was settled.

So when you sign a promissory note, drawn in the familiar form—sixty days after date, for value received, I promise to pay to the order of John Doe, the sum of One Hundred Dollars with interest at six per cent per annum—remember that it is negotiable and so is a great deal like money in that it may be freely passed from hand to hand by simple indorsement on the back, and the man who comes by it honestly has full rights against the person who signs it.

In order to possess this quality of negotiability—to be able to pass from one to another by simple indorsement, giving to the person receiving it these superior rights—a note must conform to certain legal requirements. These are stated in the Negotiable Instruments Law, a uniform act which has been adopted in similar form by practically all of the states. In general the note must be in writing and signed by the maker. Writing in its legal sense includes printing, lithographs, etc.; and the signature may be an abbreviation or a "mark." Further, to be negotiable it must contain an unconditional promise to pay a certain sum in money. There must be no "if" about the promise to pay. Also, it must be to pay money and not potatoes or nails. If you are having the house shingled and want to prevent the negotiating of a note you may give so that no one may secure from it better rights than the carpenter to whom you give it, you may do so by stating in the note that you promise to pay upon condition that the barn is shingled in accordance with the agreement.

To be negotiable, a note must be payable on demand, or at a fixed or determinable future time. Naming a future date for payment, of course, fixes the time. So, too,

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it is regarded as a fixed time if payment is to be made at the happening of an event that is *certain* to occur. Sixty days from date is a determinable future time. Further, it must be payable to order or to bearer, these words of negotiability being necessary that the instrument may possess that quality. So notes are written "pay to the order of John Smith" and not just "pay to John Smith."

A note lacking the above requirements of negotiability may still be a good contract enforceable between the original parties according to its terms. But if the note be not negotiable and the man who made it has been swindled, he may make this defense against the person to whom he gave it.

A person who intends to bind himself by the note signs simply his own name. But mistakes are made by agents who do not intend to bind themselves, personally, but only their principals. Do not sign "John Jones, agent for Samuel Smith," for that will make John Jones personally liable; but sign "Samuel Smith, by John Jones, Agent." A somewhat different rule prevails in the case of public officers, for one acting in a public capacity may sign his own name as officer and bind his principals and not himself.

The notes of corporations and partnerships are signed by an officer or agent of the corporation or member of the partnership in the name of the company. A representative or partner who is held out to the world as having authority to sign notes, may bind the company even though he may have exceeded his authority. So if you are a partner, be cautious of the public authority that is given, really or apparently, to a partner whom you do not trust absolutely.

New York Commission News

The New York Public Service Commission, Second District, has been notified by the New York Telephone Company that it has purchased the property and business of the Phelps Home Telephone Company for the sum of $15,200, and the Seneca County Home Telephone Company, operating at Seneca Falls, N. Y., for the sum of $84,000.

The commission has authorized the Glen Telephone Company, operating at Johnstown and other places, to issue $50,000 of the par value of its common capital stock, the proceeds to be used for improvements to its plant at St. Johnsville, Johnstown, Gloversville, Fonda, Glen, Canajoharie, Broadalbin and Fort Plain.

The complaint of the citizens' committee of Medina telephone users against the New York Telephone Company, which has been before the Public Service Commission for over a year, has again been adjourned by that body to allow an amendment of the complaint so that it will include a request for a lowering of the rates on business telephones as well as house telephones.

The commission made an order requiring the Federal Telephone & Telegraph Company to show cause before the Commission at Albany why an action should not be commenced to recover a penalty for apparently unwarranted delay on the part of that company in remedying dangerous conditions of wires at Warsaw. An engineer of the commission went to Warsaw on January 17, 1913 upon complaint of the village trustees as to the condition of electric wires in that village.

Solvay subscribers to the New York Telephone Company's service, and the corporation itself, break about even in the decision on the complaint of the village board of trustees, rendered by the Public Service Commission.

The complaint involved the practice of the company in its assessment of rates applying for service entirely within the limits of the village and as to other rates for subscribers located in Solvay for service only between Solvay and Syracuse, which resulted in dividing Solvay subscribers into two classes, one taking the village service and the other only Syracuse service, neither class of subscribers being able to communicate with each other without toll charge, and which was conceded to be an intolerable situation.

Hereafter no charge will be made for local service between subscribers taking the combination and those taking the village service.

Nebraska Commission News

An application was filed with the Nebraska Railway Commission on April 30, by the Lincoln Telephone & Telegraph Company, asking for an increase of rates at Wahoo.

The rates of the Goldenrod (independent) exchange at Wahoo prior to the consolidation were $1 to $1.50 per month. On the Bell, the rates were $1 to $2.50. Free service was given on one exchange or the other to Cedar Bluffs, Colon, Mead, Ithaca, Ceresco, Malmo and Weston.

The company now wants to limit free service to one town outside of Wahoo, allowing the subscriber his choice, and to charge the following increased rates: Individual business, $2.75; two-party business, $2.50. Individual residence, $1.50; two-party residence, $1.25.

The mayor and city council are willing to concede a small increase, but object to the scale proposed by the company and to the limiting of free service outside. The company claims to have spent $30,000 for improvements on the consolidated exchange.

Hearing on the application of the Lincoln Telephone and Telegraph Company to issue $1,100,000 worth of special 5 per cent stock for the purchase of additional property in the South Platte territory, and for payment of floating indebtedness, was given by the railway commission May 20. The plants to be purchased by the gigantic telephone combine are those at Hastings, Fillmore county and at De Witt. The Adams County deal will cost the company $132,500; the Fillmore County system, $41,330, and the DeWitt exchange, $22,500. This will add to the company practically the three most important exchanges thus far not controlled by it in the twenty-four counties included in the sweeping merger effected with the Belt company a year and a half ago. Construction of buildings at Lincoln, Hastings, Beatrice and other towns over the state, recites the company's application, will cost upwards of a half million dollars when completed. Other sums will bring the total of the debt to about $600,000.

Of the $7,500,000 stock and bond issue granted by the commission at the time of the big telephone deal in the state, the Lincoln company reports a total of $2,820,000 thus far issued. The balance of the securities will go upon the market as rapidly as required.

Practically all the work has been done for installing a telephone despatching system on the Toronto, Hamilton and Buffalo Railway, a subsidiary of the C. P. R. Most of the western lines of the C. P. R. are now operated by telephone.

New Law Affects Line Supervision

The principal legislation which will result from the Wisconsin session on the subject of telephone connections and service will be a bill extending the principles of the physical connection law to "town" telephone companies. By town telephone companies are meant those companies which are now fast being organized in all parts of the state by farmers for the furnishing of telephone service to residents of agricultural districts. In the physical connection bill of two years ago these companies were exempted from being compelled to furnish toll line connections with what might be deemed rival concerns. The new law will be, however, so drafted that upon order of the railroad commission practically every extension of toll line service can be ordered necessary to place every telephone in the state upon a universal toll system.

Local rivalries are practically now the only barrier which in any way prevents physical connection between all companies furnishing toll service and there are, as a matter of fact, but few companies in the state which are not now connected up so that the subscribers to the telephone systems have complete toll connections.

With this growth in the toll business, however, there is coming a question which, while it has not arisen before this legislature, will come to light later in the question of fixing the proportion of the toll receipts which shall be exacted by parent companies for furnishing the major toll service. This question more or less arose in the discussions at the convention of telephone men from all parts of the state which was held in January. It is liable to be, however, a commission rather than a legislative question.

Another question in regard to the telephone business which is likely to come up in the not distant future is that of the adjustment of rates between various cities in the state. Through the taking over of local companies by the Bell system there have arisen many strange situations, and there is little question that there are many instances in this state, where, by reason of taking over local companies or through rates that were made by competition when local companies were in existence the local service in some cities in the state is being furnished by the Bell company at a loss.

As a result these exchanges are a burden upon the other exchanges of the state and the exchanges which are paying high rates that other localities may receive their telephone service at less than cost are in time going to demand a general re-adjustment of rates.

Improvements for Cleveland's System

The Cleveland Bell Telephone Company, in addition to the $66,000 worth of construction work announced for the Eddy and Doan exchanges, has appropriated $61,000 for cable and conduit at the Main, Broad and Ridge offices.

Between Main and Ridge, $24,000 will be spent on a new trunk cable which will also provide additional trunking circuits for all the exchanges in the city except South and West, which are trunked by a different route.

The present trunk cable is capable of carrying 50,000 calls per day. The new trunk will have triple the capacity of the old.

The route will be from Main by way of Superior avenue and East 9th street to St. Clair avenue, crossing the Cuyahoga River through the tunnel; then under Washington avenue, West 25th street, Detroit avenue and West 65th street to Ridge exchange.

East exchange at Prospect avenue and East 55th street is to receive $6,000 worth of cable extensions. This construction relieves the Euclid avenue cable, which is urgently needed for new business on the north, and it also relinquishes the underground conduit and cable at Carnegie avenue and the Pennsylvania railroad. All the open wire in Carnegie avenue will be removed between the railroad and 71st street.

Grade crossing work on Euclid avenue and East 55th street will require changes in the Bell telephone conduit and cable at an expense of $60,000.

At Broad exchange $20,000 will be expended on a 600-wire underground cable. Doan exchange is to be moved to a new location recently purchased at East 105th street, next to the Y. M. C. A. building.

The building will be fifty feet wide and 170 feet long, and ultimately will be four stories in height, though at present two stories will suffice. The cost of lot and building will be nearly $100,000. The switchboards to be installed will cost $154,000, and will have capacity at present for 11,662 telephone stations on 4,760 lines, which is the development expected by the end of 1916. The electrical power plant alone will cost $8,820.

The total recently appropriated for Cleveland's Bell Telephone system is now $381,000.

American Telephones in Brazil

Consul D. R. Birch, Bahia, Brazil, says that a telephone system, American throughout in equipment and providing a service equal to that of any city in the United States, has recently been installed in Bahia and is giving complete satisfaction to subscribers. The new service was inaugurated last July under a concession held by Guinle & Company, one of the largest public utility and holding companies in Brazil, who administer the local telephones under the name Companhia Brasileira de Energia Electrica.

The telephone concession for the city of Bahia was originally granted to the Empresa Telephonica in 1884 for a period of 50 years. Six years ago Guinle & Company bought out the Empresa Telephonica, paying about $130,000 United States gold, and for a time operated the service along the old lines and with the inadequate equipment then on hand. The instruments at that time were of American make and of the kind in use in the United States about 25 years ago. The system, aside from the American instruments, was German throughout. Under the terms of the Guinle concession it was provided that a thoroughly modern service, representative of the latest improvements in telephone devices, should be installed and in actual operation by July, 1912.

American experts in telephone construction were secured, and a complete outfit of modern devices for central-exchange use and materials for outside construction work was purchased from the United States. The result is that today Bahia possesses a telephone system comprising the latest accepted types of instruments and other apparatus such as are now in use in the larger American cities. The instruments in use and much of the other equipment are of the type manufactured by the Western Electric Company. The switchboard in the local exchange is made by the Kellogg Company. There is only one exchange at present, but two others are to be opened within the year to care for outlying sections of the city.

The old company operated about 500 telephones; the new service already has 860 subscribers, and it is planned to extend and improve the service until 2,000

telephones are installed in the city and immediate suburbs. At present the lines extend about six miles to the outskirts of the city. There is no long-distance service. Important work is under way to place all wires, now overhead on poles, in concrete conduits underground. The outlay to date of changing the old outfit for the new has been over $600,000, and when the service is perfected (within the next 12 months) the total cost will approximate $1,000,000. The annual subscription for the present service has just been fixed at $58 gold for business houses and $51 for residences.

Fra Elbertus on Telephone Courtesy

The advantage and benefit of telephone courtesy is beyond computation.

The telephone is one of the great necessities of modern business. No one wants to abolish it, and it could not be done away with, even if we wanted to.

But the use of the telephone requires a certain amount of patience. You must have faith that the man at the other end of the line has something to tell you that is worth saying.

In the big central telephone offices, operators are selected with especial care to their voices. A girl may have brains all right, but if she has a voice that screams, screeches, or purrs, to that degree she is incompetent, either for telephone service or as a saleswoman.

To speak distinctly and pleasantly is a fine art. A good speaking voice is not so much a matter of training as of thinking. A person who thinks well of himself and of other people has a voice that assures. People who are anxious, nervous, irritable, hurried, harassed, tired, reveal impatience in their tones.

Anyone who uses the telephone, be he operator or patron, aristocrat or plebeian, should practice telephone courtesy. He should speak neither too loud nor too low, but should endeavor to put a smile into his voice, and not tears, doubt or accusation.

Many people on taking down the receiver will shout, "Who's this?" and not getting an answer will say, "Who are you, anyway?" This is followed up with, "What do you want?" All of which is quite useless, absurd and inopportune.

Anyone taking down the receiver should announce who he is. If you were a salesman, on entering an office you would not shout at the first man you met, "Who is this?" or "Who are you?"

When you call on a person you have never met before you certainly do not demand that he should reveal his identity until you have first revealed yours. You hand out your card, or you say, "I am Ali Baba of East Aurora." You moderate your voice and speak pleasantly.

On taking down the receiver, either to answer a call or to put one in, when you get your party, say, "This is Mr. Brown who is speaking." Just assume a pleasant attitude of mind, and your voice will follow.

I have noticed that trainmen on certain railroads, for the most part, have pleasant voices. They call the stations in a way so they are understood, and they do not appear to be bawling bad names at their enemies.

They are the voices of men who are well nourished, who get eight hours' sleep, who think well of themselves, who are proud of their job, and proud of the road for which they work.

Thus they are placed on good terms with their colleagues and with the public.—*Elbert Hubbard, in The Philistine.*

Vienna-Dalmatia Telephone Line in Use

About a year ago it was decided to establish telephonic communication between Vienna and Dalmatia, and the line—now completed—passes through Istria and over a number of islands in the Adriatic to the Dalmatian coast. The total distance from Vienna to Zara (Dalmatia) is about 510 miles. The overhead lines are of 5-mm. bronze wire, and the total length of the submarine sections of the line is 37 miles. The Krarup (distributed loading) construction was adopted in preference to the Pupin system of loading, owing to the numerous changes from submarine to overhead construction; the submarine cables were supplied by the Norddeutsche Seekabelwerke (Nordenham) whose tender was the lowest received. The cables contain four cores, each comprising a round central copper conductor surrounded by three strip conductors (total section 5.5 sq. mm.), overwound with three layers of 0.2 mm. soft iron wire, and covered with a special gutta-percha mixture to 8.4 mm. diameter. The conductors are stranded in pairs, which are then also stranded together. A brass tape covering is provided as protection against the teredo, while the armour consists of 24 galvanized iron wires of 5.7 mm. diameter on the deep sea, and of 207.1-mm. wires on the coastal, sections of the cable. No cable ship being available, the cargo steamer "Pera" was adapted to the work of laying the cable, which was effected without mishap, though the sirocco raged during part of the laying period.

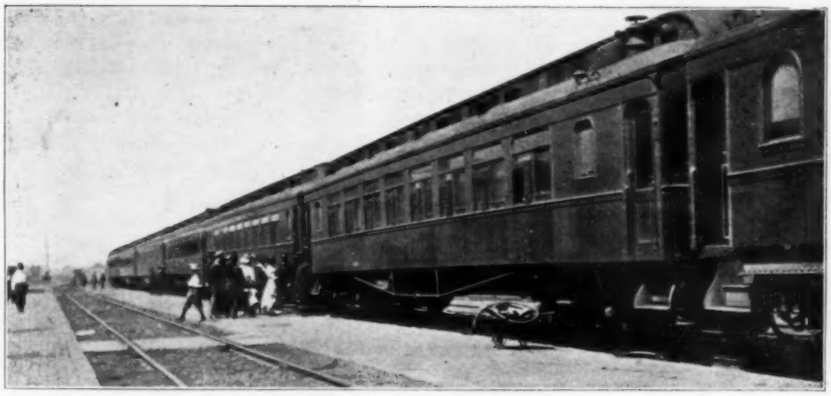
On the completion of the line, it was found that communication between its ends was very satisfactory despite the considerable leakage from the overhead lines, which leakage was particularly severe on the islands owing to the collection of thick salt deposits on the insulators and posts. The two pairs of conductors in the submarine cables were free from mutual induction, so that no cross-talk was experienced. Before laying the submarine cable the two pairs of cores were placed in series for experimental purposes, and it was found that satisfactory communication could be effected through the 75 miles effective length of submarine cable thus obtained and 395 miles of landline. Recently satisfactory speech transmission has been secured between Vienna and Sarajevo (875 miles), although the overhead lines in Bosnia are only 3 or 4 mm. in diameter.

Indiana Commission News

The Indiana Public Utility Commission at its first meeting May 1 voted to adopt the Wisconsin system of accounts for all public service corporations, except where the Interstate Commerce Commission has provided a uniform system of accounts. This means that all telephone companies, for example, having an annual gross income exceeding $50,000 will use the Interstate Commerce Commission's schedule of accounts, and those having an annual gross income of $50,000 or less will be governed by the Wisconsin schedule.

Montana Commission News

The East Side Telephone Company of Creston, Flathead County, Montana, has filed another complaint against the Northern Idaho and Montana Power Company of Kalispell, charging that the defendant company requires the complainant to pay $20 a month on its exchange business, while the defendant requires the complainant to take its exchange business free of charge.



DEPARTMENT of RAILWAY TELEPHONES

Annual Meet of Telegraph Superintendents

By John A. Kick

THE annual meeting of the Association of Railway Superintendents of Telegraph at St. Louis, Mo., from May 20 to 23, was voted in every way the most successful one ever held. The Planters Hotel was the home of the convention, which was the thirty-second one held by this hardy body of active men.

Owing to the hard work of the topics committee and the amount of interest taken in the respective subjects assigned to various members, the papers were excellent. Many of them represented the difficult task of putting into concise and interesting form, data from extended tabulated operating tests which had not heretofore been assembled. The information thus conveyed was invaluable.

In the general discussion which followed the reading of the papers the members derived the benefit of many new ideas and different view-points on the various subjects.

"Induction Troubles" served as a basis for a very fine paper by P. J. Howe of the engineering department of the Western Union Telegraph Company. It was well received and the fact that Mr. Howe is recognized as one of the foremost specialists on the subject, added to the value of his well delivered topic. The paper is published in full on another page.

C. A. Robertson and Elam Miller were jointly responsible for the fine treatment of "Some Facts on Telephone Transmission," which was given the audience by Mr. Robertson. It was a practical explanation of a decidedly technical subject. The paper will appear in a later issue of this magazine and should be read by every telephone man, as its compilers are experts in the work of transmission.

M. H. Clapp, superintendent of telegraph, Northern Pacific Railroad, had "Protection Against Lightning and High Currents for Telegraph and Telephone Equipments," as his subject. It proved to be an interesting review of the different commercial means and methods of protecting telephone and telegraph equipment. A review of the data compiled from reports of the various roads was rather at variance on nearly all types of protectors. Those reported successful on some lines were declared failures by others, this, of course, might be due to operating conditions or methods of observation being unlike. Popular opinion appeared to be in favor of some form of vacuum arrester. I. C. Forshee, of the Pennsylvania lines opened the discussion on this paper and brought out some interesting information regarding the operations of the various arresters and particularly those of the vacuum type.

It developed, in the general discussion, that the feeling is that considerable improvement in protective apparatus for railway, telegraph and telephone service is desired and expected.

J. C. Johnson's paper, "Use of the Telephone by Railroads for Dispatching Trains," was read by Mr Forshee, as Mr. Johnson was unable to be present. This paper paved the way for a diversity of opinion on the use of the telephone, for the purpose of dispatching, rather than the telegraph. C. S. Rhodes reminded the audience that the recent floods emphasized the superiority of the telephone over the telegraph and E. C. Keenan stated that messages were handled much better with the telephone.

J. F. Richardson declared that the Canadian Pacific Railway is using the telephone continuously on one division and that it is handling more messages than with the telegraph. W. J. Camp said that the Canadian Pacific's greatest saving in telephone use was on its single tracks. This road now has 1,100 miles of operated by telephone dispatching, and uses the portable telephone sets in place of siding instruments.

C. Seldon, superintendent of telegraph, Baltimore and Ohio Railroad, said he did not favor the telephone sets and attested to the serviceability of standard concrete booths, saying they are better

Department of Railway Telephones

This department is established as a permanent feature of TELEPHONE ENGINEER. The progress of the art of telephone train dispatching, its technical development, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of TELEPHONE ENGINEER in all parts of the world whose interests lie along these lines.

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adapted for use by trainmen; that the booths are not large and can be easily handled. This type of service is in use on the Baltimore and Ohio road.

"The Free Use of the Wires," by Mr. Teed, superintendent of telegraph on the Frisco Lines, was ably discussed by R. F. Finley, engineer of the telegraph department of the New York Central Lines. The general discussion was also of interest as to all of the various classes of wire service.

The sessions held on the several days of the convention were all well attended and the feeling that great good had been accomplished was a general one. The banquet was held at the Missouri Athletic Club, the entire party being the guests of the St. Louis League of Electrical Interests, Jovian Chapter.

It was unfortunate that a severe illness should have overtaken one of the associate members, H. O. Rugh of the Sandwich Electric Company, Sandwich, Ill. It was later learned that an operation for appendicitis had been necessary and successfully performed.

New Orleans, La., secured the next convention which will be held May 19 to 22, inclusive, 1914. An election put the following well-known names on the officers' list:

William Bennett, Chicago Northwestern Railroad, president.

A. B. Taylor, superintendent telegraph, New York Central and Hudson River, first vice-president.

W. C. Walstrum, N. and W., second vice-president.

P. W. Drew, Soo Line, secretary and treasurer. (This is Mr. Drew's thirty-second year in this position).

W. H. Potter, superintendent of telegraph of the Southern Railroad, was elected chairman of the eastern division, and E. C. Keenan of the New York Central Lines, chairman of the western division.

Installs Telephone Dispatching; Retains Operators

Attesting the popularity of telephone train dispatching, the Missouri, Kansas, and Texas system is now equipping approximately 800 miles, in addition to that already under operation. About 218 miles of the work is being done in Texas, between San Antonio and Houston. The company by the end of the present year will have expended thousands of dollars in the interest of the new service.

Telephone dispatching, used in a few short stretches in Texas until about two years ago, was more of an experiment than anything else, but time has proved that the voice system has many features over the dot and dash method. The new management of the Katy has also given an impetus to the extension of the telephone service.

W. H. Hall of Denison, superintendent of telegraph, is directing the work of placing in service the new mileage, which is allotted as follows: Wagoner, Ok., to Parsons, Kan., 101 miles; Parsons to St. Louis, 387 miles and from San Antonio to Houston, 218 miles. All this work is to be completed by December 1, this year. Eventually, the entire system will operate all trains by the telephone method.

C. F. Beck of Dallas, circuit manager of the telegraph system in the general offices of the Katy there, estimates that the time is not far distant when 95 per cent of all the trunk lines in the United States will be using telephones to dispatch trains.

Simplicity is one of the ruling features in connection with telephone dispatching. Everyone who has traveled on modern interurban cars has seen the motorman or conductor slow up at a pole, insert a metal plug in a socket upon a right-of-way pole, get immediate connection with the dispatcher and take orders for movement. This system in many respects is identical with the method in use by the steam railroads, the late patent greatly improving the operation.

Aside from the feature of time saving, the lifting of the handicap by which none save telegraphers could take part in dispatching of trains, any one of a train crew from the porter to the conductor in the deep woods between two stations can get in direct communication with the dispatcher and be told what movement by trains is desired. Thus it is seen that men not trained to take intelligence from the dots and dashes can act with speedy authority.

The use of telephones on the Katy system has not and will not, the officials say, displace any operators who were employed before the installation of telephone wires. The only difference is that the operators do not use the key, but use the receiver and transmitter instead. The regular telegraph instruments are kept in place and used by the operators in other forms of railroad communication. In case of telephone wire accidents the Morse instruments are readily brought into use for dispatching of trains.

Another admirable feature in connection with railroad train dispatching is found in the fact that the system is so devised that any official, say W. A. Webb, general manager, from his office in Dallas or from his home in Oak Cliff, can get connection at once with a train crew, for instance, four miles south of Waco and order a train into a siding for any reason, or it is possible and just as convenient for Mr. Webb to make inquiry of a train porter between Sedalia and Parsons as to whether Mr. Webb's pocketbook had been left on a sleeping car.

Mississippi Commission New

The Mississippi Railroad Commission has been hearing evidence in the case initiated by the commission for the purpose of inquiring into the telephone rates at Jackson. Two special sittings were necessary in order to give all the staff of Cumberland men, to say nothing of the independents, an opportunity to be heard.

There were over forty telephone men in attendance. The staff men on hand were W. L. Gentry, president, and Leland Hume, vice-president; Hunt Chipley, general counsel, and W. L. Granberry, associate counsel; C. J. Holditch, general auditor; F. E. Montague, general traffic superintendent; George Yundt, chief engineer; W. H. Adkins, contract agent; F. L. Woodruff, special agent from Atlanta and Nashville, of the Cumberland Company.

The star witness was Vice-President Leland Hume, who, as general manager, is in thorough touch with the system throughout the state. Mr. Hume's testimony was similar to that of officials who preceded him—that, under the heavy expense of maintenance, his company could not stand the effect of a general rate reduction.

The officials of the three home or independent telephone companies waived examination. It was late when the hearing was concluded, without any decision being rendered, as the committee will require the record before determining, and will also wish to hear arguments by attorneys.

Railway Telephones in the United States

Interstate Commerce Commission Report

AS is our custom each year, we present here the report of the Interstate Commerce Commission, compiled by the Division of Safety Appliances, showing the use of the telephone in transmitting train orders over the railroads of the United States at the close of the year 1912. The development of the railway telephone in the year is revealed by a comparison of this table with the one published in TELEPHONE ENGINEER for June, 1912, page 315.

Names of railroads.	*Telegraph (miles of road).*	*Telephone (miles of road).*	*Total operated (miles of road).*
Ahnapee & Western	34	....	34
Albany Southern	....	37	37
Ann Arbor	291	1	292
Arizona & New Mexico	109	109	109
Arizona Southern	20	20	20
Arkansas Central	46	....	46
Atchison, Topeka & Santa Fe	1,721	6,492	10,142
Atlanta & West Point	86	....	86
Atlanta, Birmingham & Atlantic	662	....	662
Atlantic & St. Lawrence	165	....	165
Atlantic & Western	....	16	16
Atlantic Coast Line	3,207	886	4,093
Attleboro Branch	4	4	4
Augusta Southern	82	1	83
Baltimore & Ohio	2,716	789	3,163
Baltimore & Ohio Chicago Terminal	76	....	76
Baltimore & Ohio Southwestern	963	171	963
Baltimore & Sparrow's Point	....	5	5
Baltimore, Chesapeake & Atlantic	88	....	88
Bangor & Aroostook	625	....	625
Beaver Dam	....	16	16
Bellingham & Northern	....	55	55
Bennettsville & Cheraw	....	45	45
Bessemer & Lake Erie	....	194	200
Big Sandy & Cumberland	....	27	27
Birmingham Southern	....	31	31
Bloomsburg & Sullivan	29	....	29
Blue Ridge	44	....	44
Boston & Maine	1,993	232	2,225
Boyne City, Gaylord & Alpena	....	42	42
Bridgton & Saco River	....	21	21
Brownstone & Middletown	....	3	3
Buffalo & Susquehanna R. R.	237	13	265
Buffalo & Susquehanna Ry.	91	....	91
Buffalo, Rochester & Pittsburgh	273	177	450
Bullfrog-Goldfield	73	....	73
Butte, Anaconda & Pacific	30	....	30
Butte County	31	....	31
Carolina & Northwestern	12	15	134
Central Indiana	127	....	127
Central of Georgia	1,923	470	1,923
Central New England	277	....	277
Central R. R. of New Jersey	505	....	505
Central R. R. of Pennsylvania	27	....	31
Central Vermont	403	271	403
Charlotte, Monroe & Columbia	....	18	18
Chattahoochee Valley	....	31	31
Chesapeake & Ohio	614	974	1,588
Chesapeake & Ohio Ry. of Indiana	....	262	262
Chautauqua Traction	....	25	25
Chesapeake Beach	28	....	28
Chesterfield & Lancaster	....	38	38
Chestnut Ridge	....	12	12
Chicago & Alton	1,006	19	1,025
Chicago & Eastern Illinois	822	282	1,104
Chicago & Illinois Western	14	14	14
Chicago & North Western	5,870	1,798	7,976
Chicago & Western Indiana	....	27	27
Chicago, Burlington & Quincy	6,126	2,645	9,022
Chicago Great Western	1,124	346	1,470
Chicago, Indianapolis & Louisville	578	....	578
Chicago, Kalamazoo & Saginaw	....	45	45
Chicago, Milwaukee & St. Paul	5,735	1,558	7,293
Chicago, Milwaukee & Puget Sound	....	1,898	1,898
Chicago, Peoria & St. Louis Ry. of Illinois	247	....	247
Chicago, Rock Island & Pacific	5,188	2,003	7,191
Chicago, Rock Island & Gulf	394	72	466
St. Paul & Kansas City Short Line	....	128	128
Chicago, St. Paul, Minneapolis & Omaha	1,667	....	1,667
Chicago, Terre Haute & Southeastern	196	155	351
Cincinnati, Georgetown & Portsmouth	....	54	54
Cincinnati, Flemingsburg & Southeastern	....	6	6
Cincinnati, Hamilton & Dayton	406	131	608
Cincinnati, Indianapolis & Western	262	99	361
Cincinnati, Lebanon & Northern	45	....	45
Coal & Coke	191	198	198
Colfax Northern	....	14	14
Colorado & Southern	1,073	....	1,073
Colorado & Wyoming	51	15	51
Colorado Midland	246	....	261
Columbia & Puget Sound	24	30	55
Columbus & Southern	....	23	23
Cornwall	13	....	13
Cornwall & Lebanon	22	....	22
Corvallis & Eastern	119	....	140
Coudersport & Port Allegany	39	....	39
Crystal River	17	....	17
Cumberland & Pennsylvania	3	28	31
Cumberland Valley	....	162	162
Dansville & Mount Morris	15	....	15
Danville & Western	83	5	83
Davenport, Rock Island & Northwestern	45	....	45
Dayton, Lebanon & Cincinnati	30	30	30
Delaware & Hudson	821	8	821
Delaware, Lackawanna & Western	....	985	985
Denison & Pacific Suburban	7	....	7
Denver & Rio Grande	2,507	52	2,559
Denver, Boulder & Western	46	....	46
Denver, Northwestern & Pacific	214	214	214
De Queen & Eastern	....	27	27
Des Moines Union	5	....	5
Detroit & Mackinac	209	154	363
Detroit & Toledo Shore Line	50	10	50
Dover & South Bound	....	25	25
Detroit, Toledo & Ironton	339	....	339
Dry Fork	....	37	37
Duluth & Iron Range	....	200	200
Duluth & Northeastern	....	63	63
Duluth, Missabe & Northern	186	10	196
Dunbar & Wausaukee	....	14	14
Durham & Southern	56	56	56
East Broad Top R. R. & Coal Co.	31	46	46
East Carolina	....	38	38
Eastern Kentucky	36	....	36
Elgin, Joliet & Eastern	204	7	211
Erie	1,699	175	1,874
Bath & Hammondsport	....	10	10
Chicago & Erie	249	....	249
Columbus & Erie	13	....	13
Erie & Jersey	39	....	39
Genesee River	....	32	32
New Jersey & New York	38	....	38
New York, Susquehanna & Western	233	....	233
Escanaba & Lake Superior	80	80	80
Eureka & Palisade	84	84	84
Evansville Suburban & Newburgh	....	25	25
Fairchild & North-Eastern	....	38	38
Florida East Coast	622	522	622
Fonda, Johnstown & Gloversville	36	....	36
Fort Worth & Denver City	454	....	454
Fort Worth & Rio Grande	223	....	222
Frankfort & Cincinnati	40	....	40
Gainesville Midland	....	72	72
Genesee & Wyoming	15	16	19
Georges Valley	8	8	8
Georgia	58	245	303
Georgia Coast & Piedmont	82	....	82
Georgia, Florida & Alabama	192	....	192
Georgia Southern & Florida	396	396	396
Georgia Southwestern & Gulf	35	....	35
Grand Trunk	1,044	7	1,051
Great Northern	2,652	4,769	7,421
Green Bay & Western	250	....	250
Hazelhurst & Southeastern	8	16	24
Hillsboro & Northeastern	....	5	5
Hocking Valley	331	....	331
Holton Interurban	10	14	24
Houston & Brazos Valley	40	20	60
Huntingdon & Broad Top Mountain R. R. & Coal Co.	....	71	71
Illinois Central	2,482	2,346	4,828
Yazoo & Mississippi Valley	1,374	....	1,374
Illinois Southern	136	....	136
Illinois Terminal	15	....	15
Illinois Traction	....	443	443
International & Great Northern	1,106	....	....
Interstate	16	27	27
Ironton	....	12	12
Jamestown, Chautauqua & Lake Erie	33	....	33
Johnstown & Stony Creek	....	3	3
Kanawha & Michigan	162	2	164
Kanawha, Glen Jean & Eastern	....	14	14
Kansas City, Clinton & Springfield	154	....	154
Kansas City Southern	825	....	825
Kansas City Terminal	6	11	12
Kansas Southwestern	59	....	59
Kentucky & Indiana Bridge & R. R. Co.	11	....	11
Kentucky & Tennessee	....	11	11
Kentwood & Eastern	....	52	55
Kewaunee, Green Bay & Western	37	....	37
Keweenaw Central	....	28	28
Kishacoquillas Valley	....	10	10
Lackawanna & Wyoming Valley	....	23	23
La Crosse & Southeastern	....	43	43
Lake Superior & Ishpeming	19	19	26
Laramie, Hahn's Peak & Pacific	111	....	111
Leavenworth & Topeka	....	47	47

Names of railroads.	Telegraph (miles of road).	Telephone (miles of road).	Total operated (miles of road).
Lehigh & Hudson River	73	....	73
Lehigh & New England	120	135	152
Lexington & Eastern	96	198	198
Lehigh Valley	302	1,091	1,393
Liberty White	....	49	49
Litchfield & Madison	44	....	44
Little Falls & Dolgeville	10	2	12
Live Oak, Perry & Gulf	81	81	162
Long Island	322	69	391
Louisiana & Arkansas	260	....	260
Louisiana & North West	121	....	121
Louisiana Central	....	18	42
Louisiana Railway & Navigation	333	....	333
Louisville & Nashville	2,956	1,250	4,206
Louisville & Wadley	....	10	10
Louisville, Henderson & St. Louis	187	....	187
Lowville & Beaver River	....	10	10
Macon, Dublin & Savannah	93	54	147
Maine Central	1,157	....	1,157
Portland Terminal	25	....	25
Manchester & Oneida	8	8	8
Manistee & Northeastern	197	....	197
Manistique & Lake Superior	....	37	37
Manitou & Pike's Peak	9	9	9
Mansfield Railway & Transportation Co	....	14	16
Marietta, Columbus & Cleveland	....	45	45
Maryland & Pennsylvania	78	....	78
Maryland, Delaware & Virginia	78	78	78
Maryland Electric	2	27	27
Milltown Air Line	10	10	10
Minneapolis & Rainy River	....	75	88
Minneapolis & St. Louis	1,537	....	1,537
Minneapolis, St. Paul & Sault Ste. Marie	3,596	188	3,784
Minnesota & International	175	....	175
Mississippi Central	150	26	150
Mississippi River & Bonne Terre	53	....	53
Missouri & Illinois Bridge & Belt	....	3	3
Missouri & North Arkansas	335	....	335
Missouri, Kansas & Texas	2,107	679	2,800
Missouri, Kansas & Texas Ry. Co. of Texas	602	578	1,180
Missouri Pacific	3,459	403	3,862
St. Louis, Iron Mountain & Southern	2,839	316	3,193
Missouri Southern	....	54	54
Mobile & Ohio	809	14	827
Monroe	10	....	10
Montour	10	12	22
Moscow, Camden & San Augustine	....	7	7
Mount Jewett, Kinzua & Riterville	....	19	19
Munising, Marquette & Southeastern	72	74	124
Muscatine North & South	54	....	54
Nacogdoches & Southeastern	....	20	20
Nashville, Chattanooga & St. Louis	1,230	....	1,230
Nevada-California-Oregon	....	238	238
Nevada Central	93	93	93
Nevada County Narrow Gauge	21	21	21
Newburgh & South Shore	7	....	7
New Jersey, Indiana & Illinois	....	12	12
New Mexico Central	116	....	116
New Orleans Great Northern	243	....	243
New Orleans, Mobile & Chicago	397	15	412
New Orleans, Natalbany & Natches	....	29	29
New York & Long Branch	....	38	38
New York & Pennsylvania	....	57	57
New York Central lines:			
Boston & Albany	....	387	387
Chicago, Indiana & Southern	....	303	303
Cincinnati Northern	206	....	206
Cleveland, Cincinnati, Chicago & St. Louis	482	1,398	1,880
Kankakee & Seneca	43	....	43
Lake Erie & Western	872	571	872
Lake Shore & Michigan Southern	36	1,627	1,663
Cleveland Short Line	....	20	20
Dunkirk, Allegheny Valley & Pittsburgh	....	90	90
Lake Erie & Pittsburgh	....	27	27
Little Falls & Dolgeville	10	2	12
Michigan Central	177	1,087	1,259
New York Central & Hudson River	1,085	1,800	2,885
New York & Ottawa	69	....	69
Peoria & Eastern	338	....	338
Pittsburgh & Lake Erie	24	176	200
Rutland	415	....	415
Toledo & Ohio Central	58	337	395
Zanesville & Western	85	....	85
New York, Chicago & St. Louis	511	511	511
New York, New Haven & Hartford	1,885	121	2,006
New York, Ontario & Western	502	10	512
New York, Philadelphia & Norfolk	....	112	112
Cape Charles	....	9	9
Norfolk & Portsmouth Belt	....	14	14
Norfolk & Western	153	1,637	1,889
Northampton & Bath	....	7	7
Northern Pacific	3,533	2,349	5,882
Northwestern Pacific	231	181	412
Ohio & Kentucky	26	13	39
Ohio River & Columbus	....	24	24
Ohio River & Western	112	....	112
Oregon & Southeastern	....	20	20
Pacific & Arctic Ry. & Navigation Co	20	20	20
Pacific & Idaho Northern	90	90	90
Pacific Electric	....	824	824
Pennsylvania	1,190	2,441	3,760
Calumet Western	3	....	3
Cherry Tree & Dixonville	....	28	38
Grand Rapids & Indiana	562	8	570
Manufacturer's	3	....	3
Northern Central	364	53	434
Pennsylvania Co.	664	....	664
Philadelphia, Baltimore & Washington	570	126	705
Pittsburgh, Cincinnati, Chicago & St. Louis	1,420	2	1,422
Union R. R. of Baltimore	7	7	10
Vandalia	827	....	827
West Jersey & Sea Shore	59	277	338
Peoria & Pekin Union	15	....	15
Pere Marquette	1,209	564	1,773
Pennsylvania Southern	....	16	16
Philadelphia & Reading	933	99	984
Atlantic City	167	....	167
Catasaqua & Fogelsville	29	....	29
Chester & Delaware	3	....	3
Gettysburg & Harrisburg	39	....	42
Middletown & Hummelstown	7	....	7
Northeast Pennsylvania	27	....	27
Perkiomen	38	....	38
Philadelphia & Chester Valley	24	....	24
Philadelphia, Newton & New York	22	....	22
Pickering Valley	11	....	11
Port Reading	20	....	21
Reading & Columbia	59	....	59
Rupert & Bloomsburg	2	....	2
Stony Creek	10	....	10
Tamaqua, Hazleton & Northern	10	....	10
Williams Valley	3	8	11
Pittsburgh & Moon Run	....	5	5
Pittsburgh, Lisbon & Western	25	....	25
Pittsburgh, Shawmut & Northern	176	142	255
Potomac, Fredericksburg & Piedmont	....	38	38
Prescott & Northwestern	....	36	36
Quincy, Omaha & Kansas City and Iowa & St. Louis	256	52	308
Quanah, Acme & Pacific	....	42	42
Queen & Crescent Route:			
Cincinnati, New Orleans & Texas Pacific	197	138	335
Alabama Great Southern	291	....	291
Harriman & Northeastern	....	20	20
Woodstock & Blocton	8	....	8
New Orleans & Northeastern	196	....	196
Alabama & Vicksburg	139	....	139
Vicksburg, Shreveport & Pacific	169	....	169
Raleigh & Charleston	41	....	41
Raritan River	....	19	22
Reynoldsville & Fall Creek	....	25	25
Richmond, Fredericksburg & Potomac	88	....	88
Rio Grande Southern	169	....	169
Rural Valley	....	5	5
St. Johns River Terminal	8	....	8
St. Joseph & Grand Island	259	....	259
St. Louis & Hannibal	114	....	114
St. Louis & San Francisco	4,500	755	5,255
Beaumont, Sour Lake & Western	118	....	118
New Orleans, Texas & Mexico	275	....	275
Orange & Northwestern	62	....	62
St. Louis, San Francisco & Texas	85	....	85
St. Louis, Brownsville & Mexico	497	....	497
St. Louis Merchants' Bridge Terminal	9	....	9
St. Louis, Troy & Eastern	....	19	19
St. Louis Southwestern	674	131	674
Dallas Terminal & Union Depot Co	2	....	2
Eastern Texas	30	....	30
St. Louis Southwestern of Texas	695	....	695
Paragould Southeastern	37	....	37
Pine Bluff, Arkansas River	25	....	25
Southern Illinois & Missouri Bridge	5	....	5
Stephenville, North & South Texas	105	....	105
Saline River	....	20	20
San Antonio & Aransas Pass	724	55	779
San Diego & South Eastern	25	56	81
Sandy River & Rangeley Lakes	47	30	77
San Pedro, Los Angeles & Salt Lake	1,135	....	1,135
Savannah & Statesboro	....	33	33
Seaboard Air Line	1,937	1,133	3,070
Sibley, Lake Bisteneau & Southern	....	27	27
Silverton Northern	....	13	13
South Buffalo	....	7	7
Southern	5,455	1,181	6,636
Northern Alabama	113	....	113
Virginia & Southwestern	203	....	203
Southern Iowa Traction	....	25	25
Southern Pacific, Atlantic System:			
Arizona Eastern	338	188	526
Galveston, Harrisburg & San Antonio	1,247	77	1,336
Houston & Texas Central	771	....	787
Houston East & West Texas	191	....	191
Houston & Shreveport	40	....	40
Iberia & Vermilion	16	....	16
Louisiana Western	198	....	208
Morgan's Louisiana & Texas	372	....	399
Texas & New Orleans	435	17	459
Southern Pacific, Pacific System	5,405	851	6,256
Spokane & British Columbia	....	36	36
Spokane & Inland Empire	168	....	168
Spokane, Portland & Seattle	392	150	542
Oregon Trunk	....	156	156
Staten Island	....	33	33
Sugar Land	....	33	33
Susquehanna & New York	49	3	52
Tennessee Central	294	....	294
Tampa & Jacksonville	56	....	56
Tampa Northern	....	47	60
Terminal Railroad Association of St. Louis	9	....	9
Texas Mexican	161	....	161
Texas Midland	125	....	125
Texas South-Eastern	....	28	28
Texas, Oklahoma & Eastern	....	24	24
Texas Short Line	....	11	11

Names of railroads.	Telegraph (miles of road).	Telephone (miles of road).	Total operated (miles of road).
Tidewater & Western	82	10	92
Tionesta Valley	....	74	74
Toledo & Western	64	75	75
Toledo, Peoria & Western	220	3	220
Toledo, St. Louis & Western	451	405	451
Toledo Terminal	21	31	31
Tonopah & Tidewater	174	7	181
Tremont & Gulf	....	99	99
Trinity & Brazos Valley	305	....	305
Tennessee & North Carolina	....	21	21
Texas & Pacific	1,871	....	1,885
Uintah	63	67	68
Ulster & Delaware	129	....	129
Unadilla Valley	....	19	19
Union Pacific	2,936	605	3,541
Oregon Short Line	1,754	36	1,790
Oregon-Washington R. R. & Navigation Co.	1,488	329	1,698
Union Point & White Plains	....	11	11
United Verde & Pacific	26	....	26
Victoria, Fisher & Western	....	31	31
Virginia & Kentucky	....	5	5
Virginia & Truckee	67	....	67
Virginian	....	460	460
Wabash	2,110	809	2,125
Wabash-Pittsburgh Terminal	....	63	63
Wadley Southern	....	90	90
Warren & Ouachita Valley	....	16	16
Washington, Baltimore & Annapolis	....	52	52
Washington Run	....	4	4
Washington Southern	....	32	32
Washington Terminal	2	....	2
Washington Water Power Co.	....	23	23
Waterloo, Cedar Falls & Northern	30	30	30
Waynesburg & Washington	....	28	28
Weatherford, Mineral Wells & Northwestern	42	....	42
Western Maryland	627	....	627
Western Railway of Alabama	133	....	133
West Side Belt	....	21	21
West Virginia Northern	....	11	11
Wheeling & Lake Erie	386	81	467
Wheeling Terminal	5	5	10
Wichita Valley	255	....	255
Wilkes-Barre & Hazleton	....	30	30
Williamsport & North Branch	....	54	54
Wisconsin & Michigan	100	17	117
Youngstown & Southern	....	20	20
Total	155,690	68,097	219,185

Protecting Telephone and Telegraph Lines

By M. H. Clapp*

FROM the beginning of the use of the telegraph and telephone, the consideration of different forms, methods and means of protecting the circuits and the equipment in connection with them from the effects of lightning, high voltage and power circuits has been an interesting one. At present the consideration of the subject is particularly interesting on account of the increasing number of uses and applications of telegraph and telephone equipment and combinations of the telephone and telegraph, all of which are, generally speaking, more sensitive and easily damaged by lightning and these high voltage currents and, therefore, require more adequate protection than was the case in connection with the telegraph equipment formerly used. Also, on account of the increasing number of congested centers and circuits radiating from them and other reasons, due to local conditions, and more extended use by the railway companies of their rights of way, cables are being used more and more and present their share of the problems in protection. Also, at the present time, the number of high voltage circuits is increasing and in the future there will be more and more places where possible crosses can occur between the power and telegraph and telephone wires.

In making this last statement, I appreciate that adequate specifications for the crossing and paralleling of telephone and telegraph wires by high tension circuits have been agreed upon and approved by the Association of Railway Telegraph Superintendents and four other associations and societies, and that these specifications are, without doubt, helping to raise the standard of construction of the power companies in making these wire crossings. However, there is much that remains to be done in removing hazardous crossings and parallelisms of telephone and telegraph wires by power wires.

Increased efficiency is a subject of which we hear considerable in these days and is one in which, I should judge, we are all interested and has its application in this matter of adequate protection, for if the apparatus on a circuit burns out, due to the lack of protection, there is a loss in the use of the circuit which is loss in efficiency in addition to the cost of replacing the equipment. Also, if the protection operates too easily, opens the wires or grounds them unnecessarily, there is the same loss of circuit time and efficiency.

I find that there is the greatest variation in the amounts and kinds of equipment troubles and losses that are being experienced by the different companies from the effects of lightning and crosses between power and telegraph and telephone wires. This difference is due, first, to conditions, and second, to the provision or lack of adequate protection. In certain parts of the country there is little or no trouble from lightning while in other sections there is a great deal of trouble from this source. Similarly, power wires are not much of a factor in certain localities, while in others, especially near large cities or centers, there is considerable possibility of this trouble. As a general proposition, I believe there is a lack of adequate protection for the apparatus in our railroad offices and that more attention should be given to the subject than has been given in the past.

This lack of protection, I believe, applies more particularly to the telephone circuits than to the telegraph circuits. This condition would be expected, for the simple reason that the telephone has not been in use on the railroads as long as the telegraph and, therefore, its needs from the standpoint of protection are not as well understood as those of the telegraph. There has been not only a lack of protective apparatus provided, but lax methods in the installation of protectors have been allowed, so that in a great many cases the arresters installed have not been able to operate as intended. It is, of course, obvious that if an arrester is to protect apparatus from lightning an ample and satisfactory path to ground must be provided, yet from my experience and observations, no part of the installation of protectors is so often slighted and neglected as providing proper grounds. It is, of course, difficult in some cases to provide a satisfactory ground on account of various local conditions, but, in general, these conditions can be overcome and there is certainly no excuse for providing

*Paper read at the Annual Meeting of the Association of Railway Telegraph Superintendents.

poor grounds under normal conditions. Poor and defective wiring in connection with equipment in offices I believe has a considerable bearing on troubles arising from burnouts, caused by lightning or power circuits. This applies especially to ground wires, which are often run by circuitous routes between the grounding plates on the arresters and the actual ground in the earth. Also, the so-called "crows' nests" in back of switchboards and underneath tables are not conducive to keeping down the number of equipment troubles when considered from any standpoint.

I have been unable to obtain any accurate figures as to the amount of loss of the various railroad companies during the past year or two due to burn-outs and loss of service. I can only say that, as far as the Northern Pacific Railway Company is concerned, we lost over $1,500 worth of apparatus last year, not counting loss of service. This may be high as compared with other roads and may have been due to conditions peculiar to the system and a large amount of lightning, and a few storms causing crosses between our telegraph and telephone wires and the wires of power companies.

TYPES AND KINDS OF PROTECTORS.

In order to find out as far as possible the different kinds and types of protectors used and the service obtained from them, I wrote to several of the superintendents of telegraph of the largest railway systems in the United States and Canada and asked to have certain questions answered. In the following I repeat the questions and give briefly a summary, as far as possible, of the answers received:

1st. What types, kinds and manufacture of protectors have you at present in use in your offices and on the pole lines on your system, and are they satisfactory from the standpoint of protecting your apparatus from various kinds of electrical discharges?

As would be expected, there was a considerable number and variety of arresters and combinations of arresters reported as being in use. The O'Connell arrester, now known as W. E. No. 86-A, is used quite generally and apparently is giving good results. The Chapman arrester is used to a considerably less extent. In connection with these two kinds of arresters ½, 8/10, 7 and 10 ampere fuses are being used, some being placed on the line side of the arresters, others on the apparatus side. The Western Electric Company's 58-A and Band 60-A are used more or less. One superintendent uses the Homer-Roberts arresters without fuses, apparently with good results. The Vac-M arrester has given good satisfaction in some instances; other superintendents report poor results. The Argus arrester appears to have been satisfactory in connection with telegraph circuits, but not in all cases in telephone circuits. The Brach carborundum arresters have given good satisfaction in some cases; in other cases apparently they have failed to protect; this may be due, however, to faults in their installation. Ordinary carbon and mica arresters with fuses are considered generally unsatisfactory except, possibly, on short lines, on account of their being too sensitive and requiring too much attention. It was reported that the use of metal blocks gives better results than when carbon blocks are used. The Siemans-Halske vacuum arrester is apparently satisfactory on a telephone circuit on which there is no telegraph current; where there is a telegraph current on the circuit, especially of a high voltage, this arrester gives trouble from leaks to ground. One superintendent reported using and obtaining good results from the combination of a ½ ampere Postal type of mica fuse in connection with O'Connell arresters and 58-A W. E. protectors. Some of the superintendents are placing O'Connell arresters outside of the offices at various distances from the dispatcher's office, as one-half, one and two miles, with a view of dissipating the effects of lightning discharges before they enter the office. This arrangement apparently gives good results.

2d. In placing protectors, have you found it necessary to place them both in offices bridged on the line and in offices looped in on the line?

Most of the superintendents protect their telephone apparatus both in testing and bridging offices, although there are a few that install protection only in the testing offices.

3d. Have you had any experience with the vacuum type of lightning arrester? If so, what do you think of it?

Part of the superintendents have had no experience with the vacuum arresters; a few have them on trial; a few have tried them and found the results not entirely satisfactory, and some have tried them and are very much in favor of their use. The principal trouble in connection with the vacuum arresters appears to be the difficulty of maintaining the vacuum. Also, it would appear that better results could be obtained from these arresters if the operating voltage instead of being 350 to 450 was increased to 500 to 700 volts. Possibly this might not be practicable with the present forms and sizes of these arresters used, but if it could be done, I believe that the trouble due to leaks to ground, when a high voltage telegraph current is placed on the line, would be overcome.

4th. Assuming that it is necessary, in order to obtain adequate protection, to use a high capacity line fuse and some form of open space cut-out to ground, as carbons and micas, metallic blocks and micas, carbon blocks with open air space between, vacuum arresters, etc., what amperage of line fuse do you think is necessary?

There is a great variety of opinion as to the proper carrying capacity of the line fuse that should be placed on the line side of the open space cut-outs. More than half of the superintendents who are using fuses in this position, report in favor of 10 ampere fuses; some are using 7 ampere and one superintendent is using 3 ampere fuses. The 8/10 ampere fuse which is used quite generally is usually placed on the apparatus side of the open space cut-outs, although in some cases this fuse is apparently being placed on the line side.

5th. With the arrangement of a high capacity line fuse and open space cut-out, outlined under 4, what additional fuse protection, if any, should be placed in the circuit between the open space cut-out and the apparatus, in order to protect the apparatus?

There are apparently only two or three of the superintendents who think it necessary to use two sets of fuses, one of high carrying capacity on the line side of the open space cut-outs and one of low carrying capacity on the apparatus side of the open space cut-outs. The superintendents who are using this arrangement, however, appear to think that they have a very good system of protection. Quite a few of the superintendents are using 8/10 and ½ ampere fuses on the apparatus side only of the open space cut-outs.

6th. Have you had any experience with using choke coils in the line, such as is employed with the Argus type of arrester?

Very few of the superintendents report any experience with the use of choke coils in combination with the open space cut-outs and fuses of low carrying ca-

pacity. Those who have used them, appear in general to believe that they help materially in obtaining better action of the open space cut-outs and keeping intact the fuses between these coils and the apparatus.

7th. What has been your experience, if any, in using retardation coils in series with delicate windings of telephone apparatus as a means of protection from lightning discharges?

About five of the superintendents report using retardation coils in series with the line relays of the selectors and think that these coils help materially in protecting the selector windings. The other superintendents apparently have had no experience.

As will be seen from the above summary, there is a great variation in the opinions held, practices in use and results being obtained by the different superintendents. The telephone circuits in all cases appear to have given the principal protection problems. I gathered the following points from the above summary of the letters that I received from the different superintendents of telegraph:

1. Very few of the superintendents are entirely satisfied with the present types or forms of protection at present used by them in connection with their telephone circuits.

2. There does not appear to be very much complaint from the lack of protection in connection with the telegraph circuits.

3. The best results for the protection of telephone circuits appears to be obtained from some large form of open space cut-out, as, the O'Connell arrester, placed on the line inside the office or outside, or both, with 7 to 10 ampere fuses on the line side of the open space cut-out when this cut-out is placed inside the office, with a low carrying capacity fuse on the equipment side of the cut-out. Some, however, are apparently getting very good results without the fuse of low carrying capacity.

4. The results obtained from the use of the vacuum arresters are on the whole promising in connection with telephone circuits on which there is no telegraph current. It would seem that the trouble in the use of the vacuum arresters could be overcome by increasing the distance between the electrodes and possibly changing the character of the vacuum, so that a larger voltage would be required to cause a discharge between the electrodes.

5. Very good results have been obtained by those using the retardation coils next to the line in series with the selector line relay windings.

In order to present as many circuit conditions requiring protection, and types of protection used, I desire to describe briefly the protection at present in use by the American Telephone and Telegraph Company, in connection with its long distance toll lines. It is probable that these lines, a great many of which consist of 435 pound copper wire, give as severe a condition to meet from the standpoint of protection as is found anywhere. This is especially true, as the wires of this company are cut straight through on the pole line for long distances, in some cases 200 miles, without being cut in at even a test station. In other words, there is a minimum number of lightning arresters on these wires and the arresters installed are probably called upon to take care of a maximum amount of lightning discharges as compared with the same arresters that might be installed in connection with short lines.

The protection used by this company for a long time consisted of three parts; a high carrying capacity fuse, an open space cut-out and a heat coil. The high capacity fuse was rated at 7 amperes, the open space cut-out, consisting of carbon blocks and micas, was designed to operate at a current of about 2/10 of an ampere, maintained for I believe one-half minute. All of this protective apparatus was very substantially made, being mounted on iron frames and was always well installed, and special attention was given to the placing of substantial grounds in connection with the open space cut-outs. This protection, generally speaking, was reasonably satisfactory, although burn-outs in the apparatus did occur, principally from lightning discharges. These burn-outs usually occurred in the cables or apparatus between the open space cut-outs and the heat coils. Also, there was always trouble from noisy lines after an electrical storm, due to grounds either partial or absolute at the open space cut-outs.

In order if possible to correct these faults, the A. T. & T. Company some five years ago began placing a second heat coil in each wire next to the open space cut-out and between the open space cut-out and the apparatus. This heat coil had a carrying capacity of 4 amperes for about three minutes and was intended to protect the apparatus and cables between the open space cut-out and the heat coil already in circuit next to the various electro-magnet windings, telephone receivers, resistance, etc. This additional heat coil in the circuit has, I understand, given very good results. Also, about three years ago the A. T. & T. Company began a series of experiments with the use of metallic blocks instead of carbon blocks in the open space cut-outs and the use of choke coils of the Argus type placed in the line on the apparatus side of the open space cut-outs. The Company has found that there is considerable less trouble from partial grounding of the line by the use of metallic blocks. I have not been able to ascertain the results obtained from the use of the choke coils; I assume, however, that their use has been of some benefit.

The present practice of the Western Union Telegraph Company in protecting cables and apparatus is, I believe, familiar to all of us. Briefly, a 15 ampere cartridge fuse and an open space cut-out, consisting of carbons with micas .011 inch thick, are used in connection with each conductor of dry core cables or long rubber insulated cables. As the 15 ampere fuses only fit the 7 inch arrester blocks, 10 ampere fuses have been used at various points where 6 inch blocks were already installed and where it was not considered advisable to replace the latter blocks. For the protection of apparatus at offices, where suitable attendants are available at all hours, 8/10 ampere fuses are used. If the wires are brought into the office without the cable protection mentioned above, the cartridge type of 8/10 ampere fuse is used and is combined with carbon block lightning arresters having micas .011 inch thick, mounted on 6 inch arrester blocks. At stations where the arrester protection exists at the outer end of the cable, the 8/10 ampere fuses may be either of the cartridge or W. G. B. heat coil type and are mounted at the entrance of the wires in the switchboard. In order to reduce service interruptions at offices where no attendant is available during certain hours, the 8/10 ampere fuses are replaced by 3 ampere cartridge fuses, open space cut-outs consisting of the carbon blocks and micas being used as before.

CONSIDERATION OF THE THEORY OF PROPER PROTECTION.

On account of the number of wires involved, the sensitiveness of the apparatus to be protected and the character and number of buildings and offices entered

by telegraph and telephone wires, it is impracticable in protecting telegraph and telephone equipment to use arresters, fuses and circuit breakers of the types used in electric light and power work. The protective apparatus that must be employed in connection with telegraph and telephone equipment must be of relatively small size compared with electric light and power protective equipment on account of the large number of wires that must be equipped in any one office or cable box and the space available for installing protective apparatus. The sensitiveness of the apparatus involved in telegraph and telephone service also demands a far different type of protective device from that used by electric light and power companies. For the above reasons, it is not practicable to design protectors for use in telegraph and telephone service that will be satisfactory in case of contact between telegraph and telephone wires and all classes of electric light and power wires. The safety of telegraph employees, buildings and equipment must, therefore, be obtained in two ways: First, by preventing the possibility of contact between telephone and telegraph wires and certain classes of electric light and power wires known as high tension wires, and second, by suitable protective apparatus which will protect against lightning and in case of contact between telephone wires and low tension electric light and power wires. Low tension electric light and power wires may be defined as those on which the voltage is less than a certain specified maximum and in connection with which, on account of the nature of the power and light service, it is impracticable to prevent the possibility of contact by proper separation between these wires and the telegraph and telephone wires.

It can be stated, I believe, that it is practicable to devise protection in connection with telegraph and telephone wires which will provide reasonable safety to persons, buildings and apparatus in the case of lightning discharges, also in the event of contact between the telegraph and telephone wires and low tension electric light and power wires of the following character, viz.: Constant potential metallic circuits not to exceed 5,000 volts, alternating current series circuits not to exceed 5,000 volts, direct current series circuits not to exceed 7,500 volts and direct current railway circuits not to exceed 1,000 volts. For electric light and power wires others than these and commonly known as high tension wires it is impracticable to design protection which will provide safety in the event of contact of these wires with telephone and telegraph wires. Therefore, we can only expect to obtain protective equipment for telegraph and telephone service that is designed to protect against lightning and against contact with certain definite classes of low tension electric light and power circuits. High tension electric light and power circuits not within the limits described above should be so located with respect to telegraph and telephone lines that the danger of contact between the two classes of wires is reduced to a minimum. This is obtained where one line parallels the other by providing such a separation between the two lines that in the event of failure of one line, the two classes of wires cannot come into contact. Where such high tension lines must of necessity cross over the pole line carrying telegraph and telephone wires, the liability of contact should be provided against by the application of the Specifications for Overhead Crossings of Electric Light and Power Lines adopted by our association two years ago at the Boston meeting, and to which reference has already been made.

The matter of obtaining adequate separation between high tension and low tension lines where such lines parallel each other, is one which should be given most careful attention. Close parallelism by high tension and low tension lines should be guarded against, not only on account of the hazard to life and property, but also on account of interference with telegraph and telephone service due to induction from the high tension line. While the amount of interference due to induction can be greatly reduced by proper maintenance and suitable transpositions in both the trasmission wires and the telephone circuits, still if the parallelism is a close one and of considerable length, there will probably be serious interference with both telegraph and telephone service. The construction of high tension transmission lines on railroad rights-of-way or on private property closely paralleling the railroad right-of-way should be discouraged as far as practicable, not only on account of the hazards to life and property, but also on account of the interference which such lines are liable to cause with telegraph and telephone service.

From the information that I am able to gather from the various sources, from the experiences of the different railroads and from my own experience, I believe that the following is the correct theory of protection for telephone and telegraph apparatus containing delicate points and windings from the action of lightning and crosses with low tension power and light circuits. The protection should consist essentially of three parts:

(a) A high capacity line fuse.

(b) An open space cut-out or lightning arrester such as formed by the use of carbon or metallic blocks mounted with a separation either in the air or in a vacuum.

(c) A low capacity fuse or heat coil.

Fuses provided in connection with protectors should have the following requirements:

(a) They should operate on a specified current within a given period of time.

(b) They should break any arcs likely to result from the operation of the fuses on a high voltage.

(c) They should be capable of withstanding without operating brief "flashes" of heavy current such as occur when lightning discharges pass through the arresters.

Special designs of the cartridge type of fuse have proved most satisfactory in meeting these requirements.

(To be continued.)

Service Association's Rule Book

The book of Rules and Regulations governing the handling of long distance circuits and traffic of independent telephone companies has been published by the Telephone Service Association, Chicago, and is now in the hands of its members. It comprises 72 pages of instructions bound loose-leaf form in flexible cloth for convenience.

The compilation of this book represents a vast amount of work. Completed, it forms an unexcelled guide to the handling of long distance business, something that has long needed systematizing.

The book of rules has been officially adopted by all Michigan independent operating companies through the Michigan Traffic Association, while 500 copies have gone to the Tri-State Telephone Company at Minneapolis and 200 to the Inter-State Telephone Company at Aurora, Ill.

Of Interest to the Trade

By A. L. Haase

Storing Coal at Hawthorne

Every manufacturing concern that operates its own power plant is confronted with the problem of supplying fuel economically at all times, says the *Western Electric News*. During the summer months when deliveries from the railroads are regular it is comparatively easy to get shipments direct from the mine in sufficient quantities and at sufficiently regular intervals to supply the demands of practically any power plant. During the winter months, however, when the cold weather sets in and the demand for coal is at a maximum, when transportation is irregular, due to the inclement weather and deliveries are held up on account of shortage of cars, the problem presents quite another aspect.

Some of the larger manufacturing concerns and a great many of the railways have made it a practice to store coal on vacant property in the open air. This is practical to a certain extent where the large sizes of coal are used. However, coal stored in this way oxidizes rapidly and loses a large per cent. of the heat value. Some authorities put the loss in heat value from coal stored in the open air for one year at from 12 to 24 per cent.

Method of Coal Storage Employed at Hawthorne.

Coal stored under cover, such as coal bunkers in a power plant, is very apt to catch fire due to spontaneous combustion. During the year 1902 a study of this problem was made by the Western Electric Company. It was known that the British admiralty had carried on some experiments in connection with soft coal stored water, but no definite information was available. It was concluded, however, that if coal was stored under water spontaneous combustion could not arise and a loss from this source would be prevented. A concrete pit (not waterproof) with a capacity of 3,000 tons was constructed at Polk street and the Chicago River. This was flooded with water and the water level maintained by the river. Coal cars were run under a traveling crane, which unloaded the coal into the pit. Although no exhaustive tests were made with coal used from this pit, there seems to have been no great shrinkage in weight and no trouble has been experienced in burning the coal.

This plan of storing coal under water seemed to work out so well at Clinton street on a small scale that it was decided to adopt something of a similar nature at Hawthorne to provide for the reserved storage for the new manufacturing plant. In 1906 plans were made and a concrete pit constructed with a capacity of 10,000 tons of soft coal. This pit is divided into three sections and occupies an area of about 310 feet by 114 feet. The original plans were to make it 15 feet deep, but in some sections rock was struck before that depth was reached and excavations at other portions were carried down to rock. This pit is kept flooded with water. The rain from the roofs of the adjoining buildings is piped to it and when this is not sufficient, water from the city mains is turned into the pit.

Tracks run the length of the pit and coal is set in there by the railroad and unloaded by hand.

When it is necessary to draw on the reserved supply of coal for the boiler room, cars are placed on the two outside leads of track and the locomotive crane operating between them loads coal, by means of a grab bucket, into cars on each side of it.

The coal, being stored under water, is naturally very wet when put into cars, and it is necessary to let it stand from 24 to 48 hours on track to allow the water to drain off. After the cars have drained sufficiently they are switched over to the power plant and run into the bunkers over the boilers on a trestle. The coal is fed down from the bunkers to the chain grate stokers by means of chutes of the usual construction.

Tests have been made by the University of Illinois on coal stored under water, which indicate that the loss of heat amounts to only 1½ per cent. Aside from the saving of from 10½ to 22½ per cent. in the heat value there is even a greater advantage gained in the fact that a much smaller size coal may be stored indefinitely without danger from spontaneously ignited fires.

It is believed it is practically impossible to store Illinois screenings to any considerable depth in open air without a large loss from such fires, while in the Hawthorne pit the company is storing Illinois coal, known as "1" screenings (soft coal dust and pieces up to the size of a walnut), with a very little loss in heat value and no danger whatever from fires.

Miniature Weston Instruments

There are many occasions when voltmeters or ammeters are required which are light, of small size, and yet accurate, durable and reliable. These conditions were met in the production of a line of miniature voltmeters and ammeters, recently put on the market by the Weston Electrical Instrument Company, Newark, N. J.

They are constructed on the permanent magnet movable coil principle and the line includes voltmeters, ammeters, volt-ammeters, special battery testing voltmeters and milli-ammeters. Single, double and triple range volt-ammeters are also offered in various combinations.

The standard finish is dull black with nickel trimmings. The weight of these instruments is less than one pound each, and they are so compact that they may be easily carried in a coat pocket.

The portable forms have knife edge pointers, and the switch board type has a pear shaped or "spear-head" pointer, to permit its being read at a distance. The scale is 2.75 inches in length and the entire instrument in portable form has outside dimensions of only 4.4 by 4.6 inches. These instruments are practically unaffected by changes in temperature and are shielded against magnetic fields.

Fig. 1 shows a triple range volt-ammeter which is just one-half actual size. With this instrument any current from 30 amperes to 0.05 ampere may be determined, and any voltage from 150 volts to 0.02 volts may be directly measured.

Fig. 1.

Fig. 2 is an illustration of a miniature switchboard motor (Model 267).

The movements in these instruments are practically identical with those in the portable form, made only in single range with back connections.

Fig. 3 represents a battery testing voltmeter, one-half actual size. A steel point may be fastened to one terminal and a flexible cord with another point attached to the other terminal. These are furnished with the instrument and permit the rapid measurement of the individual cells of a battery. The scale is regularly calibrated with zero in center.

Fig. 2.

On automobile dash boards, on gasoline launch switchboards and elsewhere, when space is an important consideration, and one instrument must be used for the determination of current and emf. the Model 268 Weston volt-ammeter is specially useful. Normally it indicates the charging or discharging current, but when pressure is applied to a contact button it registers volts, without breaking the current circuit.

Fig. 3.

Fig. 4.

The price of these instruments is remarkably low, and they are fully guaranteed in every respect.

The Italian war department is working on the perfection of a new wireless telephone system, whereby communication between distances as far apart as Rome and Tripoli was established. The inventors, Professors Moretti and Vanni, donated their invention to the state for military purposes.

Sumter-Dean Telephones for the South

The Sumter Telephone Manufacturing Company, Sumter, S. C., announces that it has turned over the business of its telephone department to the Sumter Telephone Supply Company, a corporation which will also represent the Dean Electric Company of Elyria, Ohio, thus forming a combination of the well known Sumter-Dean lines.

The new Sumter-Dean line will embrace everything necessary for the large and small exchange, from multiple switchboards to construction material, and particularly farm line telephones and small boards especially suited to meet southern operating conditions.

This complete line will embody the experience of skilled engineers and is especially suited for use in conjunction with either the Sumter or Dean apparatus.

An immense stock of apparatus and supplies will be located at Sumter, and with factory stocks to draw from, shipments will be made practically the same day orders are received. There are seven railroads running out of Sumter, which makes it a splendid distribution center for the southern states.

The advent of the Supply Company will be welcomed by southern independents, as it will be the only independent concern in the South. The apparatus should be especially worthy of consideration, being backed by the reputation and skill of two of the oldest and largest independent manufacturing concerns.

The formation of this new company in no way affects the existence of the Sumter and Dean companies. The Sumter Telephone Manufacturing Company is enlarging its facilities, but will confine itself to the production of ignition apparatus. The Dean Company will continue the manufacture of its regular line as heretofore and in addition will furnish the Sumter-Dean apparatus for the Sumter Telephone Supply Company, and renewal parts for the switchboard apparatus as heretofore made by the Sumter Telephone Manufacturing Company.

A prosperous future is predicted for the Supply Company which is now in position to fill orders promptly.

Automatic Electric Company Issues House Organ

The Automatic Electric Company, Chicago, manufacturer of Automatic telephone equipment, is issuing under date of June 1, the first number of its monthly house organ known as *The Automatic Telephone*. In many ways this is a distinctly unique publication and will, it seems certain, command the attention of the telephone world.

The publication takes somewhat the form of a newspaper, four pages, 18 by 24 inches, printed on a heavy distinctive paper, and has an excellent and attractive appearance.

On the first page appears a number of articles telling of recent important events in American telephone development. A comprehensive survey of the wide adoption of Automatic equipment since January 1, 1913, makes very interesting reading.

But although the spreading of a knowledge of Automatic advantages among telephone men is, of course, the main purpose of *The Automatic Telephone*, the publication has been conceived and executed along broad lines, which adds greatly to its interest. Excellent articles written by several well known telephone experts, members of the Automatic staff, present subjects along technical lines of permanent value to every one engaged in telephone work.

This publication is being sent without charge to all who are likely to be interested in its contents.

TELEPHONE ENGINEER extends to *The Automatic Telephone* a cordial welcome into the telephone publicity field and feels certain that time spent reading it will be well spent, not only for information thus obtained, but also for the broad survey of the whole telephone problem the journal presents.

Automatic Electric's New Engineering Branch

The Automatic Electric Company, Chicago, announces the establishment of a new branch in its engineering department and has retained Bernard C. Groh, formerly chief engineer of the Illinois Telephone & Telegraph Company, to take charge of the work.

Mr. Groh's position will be that of plant construction engineer, a new one in many respects in the telephone manufacturing field. This was created mainly to meet the increased demands for expert advice along the lines of scientific management as applied to the designing of Automatic telephone exchanges.

A harmonious arrangement of the entire plant, outside as well as inside, is necessary in order to obtain the full efficiency of Automatic equipment and the manufacturers in the past have made a practice of detailing members of their engineering staff to act in an advisory capacity to operating companies installing Automatic equipment. So valuable has this practice been to the operating companies that it was decided to group this work under the direction of one man especially well fitted to handle it and Mr. Groh was decided upon as being that man.

The making of development studies for existing and projected plants and also the standardization of plans and specifications for companies contemplating the enlargement of their present plants or a change from manual to Automatic equipment, will be another important feature of Mr. Groh's work. The Automatic Electric Company regards the inauguration of this work as an important step toward the establishment of a thoroughly efficient service department, the chief mission of which will be the development of the full efficiency in the individual Automatic exchange and the elimination of unnecessary cost due to improper adjustment of the different parts of the system.

Mr. Groh has been engaged in telephone work for the past 15 years, starting as a member of the engineering department of the Michigan Telephone Company at Detroit. Later he had a varied experience in the Erie Bell system; as superintendent of equipment for the Interstate of New Jersey and with the American Telephone and Telegraph Company at Boston. About four years ago Mr. Groh severed his connection with the Bell companies to become chief engineer of the Subway Telephone Construction Company in Chicago. When the Automatic telephone system in Chicago was taken over by the Tunnel Company he became its assistant chief engineer and subsequently chief engineer of the Illinois Telephone and Telegraph Company.

While with the A. T. & T. Company, Mr. Groh devoted a large share of his attention to the standardization of construction specifications and methods. Among his construction work may be mentioned the building of the Trenton and Atlantic City system.

Mr. Groh is widely acquainted in the telephone field and his many friends will be glad to learn of his new connection and will wish him success in it.

Foreign Automatic Installations

The announcement of the adoption of Automatic equipment for two new exchanges, at Santiago, Cuba, and at Newport, England, proves once more the growing popularity of this system of telephony.

The growth of the Automatic telephone system in Cuba has been remarkable, an increase of 300 per cent in the number of subscribers having occurred during the past two and one-half years. In 1910, just before the Cuban Telephone Company installed the Automatic apparatus, there were some 4100 telephones in use throughout the island, while in February of this year, the names of 12,229 subscribers appear on the company's book. In addition to this orders have been placed by the Cuban Telephone Company for 5,000 additional lines of equipment with the Automatic Electric Company, Chicago, the latest order being for an initial installation of 2,000 lines for the Santiago exchange. The plant is to consist of 20 line switchboards of 100 line switches each and there will also be installed secondary line switches, first selectors, second selectors and connectors making a complete 10,000 system exchange. The initial power equipment, desks, etc., admit of an ultimate installation of 5,000 lines. All of the apparatus is to be shipped by September 1, 1913, and will be installed under the supervision of the United Construction & Supply Company, which has had charge of the construction work of all the plants of the Cuban Telephone Company.

As a result of very careful and exhaustive studies of Automatic apparatus on the part of its experts, the British post office department, which has charge of the telephones in that country, has decided to inaugurate the installation of an extensive system of Automatic telephones. A start has already been made with a 500 line installation for the general post office in London and 6,000 lines for Leeds. In line with these plans comes the order for 2,000 lines initial installation for the city of Newport. This equipment will be modern and complete in every respect and will be so installed as to admit of large extensions when occasion demands.

The Utility of the Rural Telephone

"Marooned on a desert island!"

The condition of the man who was marooned on a desert island was not very much worse than that of the farmer who does not possess a telephone. True, the former's solitude was solitude in every sense of the word, while the latter at least has his family and the hired help about him. But as far as communication with the outside world is concerned there is little difference. A telephone-less farmer and his family, who live miles away from their nearest neighbors, are marooned on the lonely stretches of the farm acres. Their isolation is practically complete.

The farmer who has a telephone is always within talking distance of his neighbors five, ten, fifteen or more miles away. The answering voice when he calls is as good as a hearty handshake. It brings with it a sense of nearness, which may prove to be a real help in an emergency. An unusual illustration of this will be found in the following article from a Pennsylvania daily paper.

TELEPHONE TELLS HOUSE IS AFIRE

(Special telegram to The Public Ledger)

Williamsport, Pa., March 24.—"Your house is afire," was the surprising message that came over the telephone to Miss Lydia Sheadle at her home in Nippenose Valley this morning. At the same instant she heard the crackling of flames on the second floor, and with her sister and mother had barely time to gather up a few belongings and escape before the roof fell in.

The nearest neighbor, a half mile away, had seen flames shooting from the roof. He notified the telephone operator, who called the Sheadle home and summoned every farmer in the district to help fight the blaze. Other buildings on the farm were saved.

Not only does the rural telephone prove a valuable aid in an emergency, as it did in this case, but in the everyday life of the farmer as well. When he needs something from town it is not necessary to hitch Old Dobbin to the buggy and drive to town perhaps only to find out that the store is all out of what he came for. He can step to his telephone, call up the store and order his supplies. The farmer saves time, his horse and his wagon. A minute at the telephone suffices!

The telephone's commercial value to the farmer is greatly increased by the help it gives him in selling operations. Before he takes his produce to the markets, a few minutes spent at the telephone will give him a report on the price situation. He can then take his produce to where he can get the best price. Better still, he can ofttimes even close his sales over the telephone after getting his market report, without first having to drive into town.

When the crops are growing or ready for gathering, the telephone may be the means of saving a whole season's work from destruction by enabling the farmer to telephone to the post office every morning to obtain a reliable government weather report. If frost or storms are predicted, he can take measures of protection in time to avoid a partial or even a total loss.

Then there is a social side of farm life. In ten minutes the telephone will get in touch with all of the near neighbors and in almost less time than it takes to tell it, arrangements are completed for a husking bee, a barn dance, or any other form of amusement. By offering in this way what are considered the advantages of city life the telephone has become a greater factor in the continually spreading "back-to-the-farm" movement. It helps to keep the young man on the farm and so it aids in the development of the country's natural resources.

As an indication of the extent of rural telephone development in the United States, the Western Electric Company, which has been one of the pioneers and leaders in that development, reports that during 1912 over 100,000 rural telephones were sold by it to farmers' mutual companies, or direct to farmers themselves, making a total of over half a million telephones in four years. There are now over two million farmers using the telephone and the number will increase as the other three millions come to a realization of the real help the telephone will be.

How to Make a Rubber Patch

The Simplex Manual (a new edition of which is about to be published by the Simplex Wire & Cable Company of Boston) gives the following directions for making a rubber patch:

First of all scarf down the insulation on each side of the place to be patched, just as you would sharpen a pencil. Then scrape the insulation thoroughly clean some distance back from the scarf, taking pains to procure a smooth surface. Apply rubber cement and wait until it is almost dry. Then take patching rubber in the form of tape and, commencing on the scarf near its lower end, wind the tape spirally across the bare metal

to the corresponding point on the other side, keeping it under all the tension it will stand. Keep winding back and forth rising higher and higher each time, until the tape is wound to a diameter slightly larger than the original insulation. Then vulcanize the patch or, if this is not done, cover the patch with ordinary friction tape, and paint with a good insulating compound.

Interesting Case for the Telefault

An excellent testimonial for the Matthews Telefault, as well as an interesting example of successful trouble shooting, is revealed in the following letter to Claude Matthews of W. N. Matthews and Brother, St. Louis, Mo., from A. A. Buck, general manager of the Brevard County Telephone Company, Indianola, Florida:

We are using an ordinary 15 pair lead encased aerial cable for crossing the Indian River at Cocoa, Fla., to Merritts Island, a distance of 7.750 feet. This cable was laid on the river bottom, which is of sand, and we have had no trouble of any kind except from sharks and sawfish which evidently take the cable for eels, biting and striking it, causing various sizes of punctures, generally small. We have had some twenty odd punctures from this cause and in nearly all cases the teeth just going through the lead case.

It was rather a difficult matter to locate these punctures with the ordinary cable testers, on account of the various amounts of moisture and the difficulty of knowing just how many feet from the shore you are even if you have an accurate measurement of haw far from the end of the cable the puncture is, and often the puncture is so small it is hard to see or find with the eye.

We purchased a Matthews Telefault and must say it has given the best of satisfaction. No matter how large or small a puncture it will readily locate the moisture, show amount of cable that is wet, giving us an idea whether it is necessary to splice in a section or if it can be dried without cutting. If we dry it, it will show when it is dried.

We find it unsatisfactory to try to dry out more than six inches of water so you can readily see what a great advantage it is to know how much of the cable is wet.

On account of the rapidity of locating wet spots with this tester we seldom have to splice in a section as in some cases we locate the moisture, dry it out and return to river bed within three hours after puncture.

If the above will be of any interest to you, you are at liberty to use it to the best of advantage as I appreciate the fact that the more these testers are used the better for the telephone business.

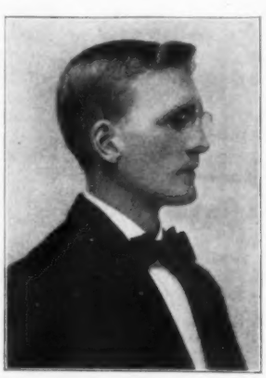
Facts About Father Time

"Horology" is a very dry-sounding title for a book, and so he who picks up a copy of it will be agreeably surprised. It is by Henry Abbott, president of the Calculagraph Company, and its sub-title is "History of Time Measurement and of Time-Measuring Instruments." It goes back into very ancient history indeed, and far from being dry, is fairly romantic and as good reading as any historical novel. Those interested can secure a copy from the Calculagraph Company.

Brevities of the Business

PERSONAL NOTES.

Charles Ellis Heston has just entered the employ of W. N. Matthews & Brother, St. Louis, Mo., as sales manager of the telephone department. He was born at State College, Pa., February 9, 1883, and was educated at the Seattle, Wash., high schools, South Dakota Agricultural College at Brookings, S. D., and was a member of the class of 1905, University of Wisconsin, college of engineering. He is a Mason and a member of the Masonic Club and the Gamma Lambda chapter of Sigma Nu. He was with the Dakota Central Telephone Company, South Dakota, 1899-1900, as lineman and exchange manager; 1900-01, with Chicago Telephone Company, as switchboard manager; summer of 1902, installer with Stromberg-Carlson Telephone Manufacturing Company; summer of 1903, manager of Brookings telephone exchange, Brookings, S. D.; summer of 1904 with engineerng department of Wisconsin Telephone Company, Milwaukee, Wis.; 1904-10, with electrical division of War Department as electrical engineer in charge of electrical installations at New York, Potomac river, Puget sound, Manila, Philippine Island harbors and sea coast fortifications; 1911, salesman with Tower-Binford Electric Manufacturing Company, Richmond, Va., and from 1911 to spring of 1913 with Stromberg-Carlson Telephone Manufacturing Company as salesman, giving special attention to all sales work of the government.



Charles P. Smith of Burlington, Vt., was elected a director of the New England Telephone and Telegraph Company to fill the vacancy caused by the death of Fletcher D. Proctor, formerly governor of Vermont, and Edward B. Winslow was elected to fill the vacancy caused by the death of John S. Hill, formerly governor of Maine. F. A. Houston succeeds Colonel William R. Driver, who resigned as treasurer.

C. W. Murphy has taken a position as railway and mine sales specialist with the Western Electric Company, with headquarters at the Pittsburgh house. Mr. Murphy has a wide acquaintance in the operating field, having been connected with the Rochester and Eastern Railway, the Buffalo, Lockport and Rochester Railroad, the Westinghouse, Church, Kerr Company and the Tri-State Railway and Electric Company.

Manager Brett will come to Grand Rapids from Detroit to take charge of the new accounting system of the Michigan State Telephone Company. The new system will be that now in vogue in the large offices of the Bell telephone system throughout the country. Mr. Brett is familiar with the new accounting system, having been in charge of that branch of the Detroit office.

John C. Lynch, heretofore division superintendent of traffic of the New York Telephone Company, at Newark, has been appointed to succeed William R. Driver, Jr., as general superintendent of traffic of the Bell Telephone Company of Pennsylvania and its associated companies in New Jersey, Delaware and portions of Ohio and West Virginia. Mr. Driver has been elected general manager of the New England Telephone and Telegraph Company, with headquarters in Boston.

Charles E. Scribner, whose election to a vice-presidency in the American Institute of Electrical Engineers is officially announced, has been chief engineer of the Western Electric Company and the directing mind of its engineering activities since the company's small beginnings more than thirty years ago.

G. M. Dallas has been appointed assistant manager of the Western Electric Company's Atlanta house. Mr. Dallas, who is a graduate of the United States Naval Academy, entered the employ of the Western Electric Company in 1911, and has been located in the New York office.

Benjamin R. Western, president and treasurer of the Manufacturers Publicity Corporation, which handles many advertising accounts familiar to the telephone trade, died last month.

William Mueller, for many years in the wooden pole business, has taken a position with the Western Electric Company as head of the Chicago branch of the company's pole department, left vacant by the death of James C. Kenny.

W. H. Schuyler, former superintendent of the New York Telephone Company's offices in Plattsburg, Pa., and later acting as local manager of the Mountain Home Telephone Company

in the Plattsburgh district has been promoted to be commercial superintendent of the Mountain Home Telephone Company. Mr. Schuyler will have charge of all matters pertaining to contracts and collections in the entire territory. His offices will be located in the executive building at the corner of Clinton and Oak streets.

T. R. George, until recently in charge of the development branch of the engineering department at the Western Electric Company's plant at Hawthorne, Illinois, has been appointed head of the Hawthorne division of the general telephone sales department. His place in the engineering department has been taken by R. R. Ireland, formerly in charge of one of the sections of the New York division.

C. F. A. Siedhof, assistant secretary for the New England Telephone and Telegraph Company, was promoted to secretary of the company to relieve E. W. Longley, general auditor of his duties.

F. H. Leonard, a former resident of Plattsburg, Pa., and for the past two years local manager of the New York Telephone Company at Malone, assumes the duties recently in charge of Mr. Schuyler with the Mountain Home Company.

W. E. Lyon, formerly of Birmingham, Ala., was appointed manager of the Bell Telephone Company at St. Augustine, Fla. The new manager has taken charge, relieving J. F. Brady, who has been promoted to the construction department at Jacksonville.

William R. Driver, Jr., of Philadelphia, general superintendent of traffic of the Bell Telephone Company of Pennsylvania and its associated companies in New Jersey, Delaware and portions of Ohio and West Virginia, has been elected general manager of the New England Telephone & Telegraph Company, with headquarters in Boston.

John S. Kennedy of Albany, N. Y., who has been the secretary of the Public Service Commission second district since it came into existence in 1907, left the service of the state on May 15 to go with the New York Telephone Company.

J. W. Crews, former general superintendent of the Southern Bell Telephone Company in Norfolk, was elected vice-president of the Chesapeake & Potomac Telephone Company at a meeting of the board of directors in Richmond. Mr. Crews left Norfolk to become general commercial superintendent, with headquarters in Richmond.

E. B. Winslow of Portland, Me., and Charles P. Smith of Burlington, Vt., are two new directors of the New England Telephone and Telegraph Company.

Francis A. Houston, general manager of the New England Telephone & Telegraph Company, was chosen at the annual meeting of the corporation, to succeed Col. W. R. Driver as treasurer. Col. Driver resigned after serving the company since its organization 30 years ago, in addition to acting as treasurer of the American Telephone & Telegraph Company.

O. E. Metzler, who has been wire chief with the Independent Telephone Company at Savanna, Ill., for a number of years, has resigned, and has accepted the position as manager for the Mutual Telephone Company.

G. W. Treadway, manager of the Central Union Telephone Company at Peoria, Ill., received the commission of district manager of the company's interests in ten counties surrounding Peoria. His headquarters will remain in that city and he will continue to look after the interests of the Peoria clientele.

Hiram G. Conger, formerly manager for the Central Iowa Telephone Company, but now with the Bell Telephone Company in Des Moines, has been given charge of the Des Moines district, in addition to his work in the city, and will succeed Colonel Allen.

Edward P. Parish, who has been employed by the A. Duchateau Company for several years, has been appointed commercial agent of the Wisconsin Telephone Company at Green Bay. He has assumed his new duties. Mr. Parish succeeds H. W. Gosslin, who died a short time ago.

Fred D. Caldwell, who was once a resident of Fairfield, Ia., a student in the high school and later a student at Ames, has been for three years past superintendent of the Home Telephone Company at Spokane, Wash. When he resigned his position recently a hundred officials and employees of the company presented him with a handsome gold watch. Mr. Caldwell has gone to Edmonton, Alberta, Canada, where he has the superintendency of a large telephone company and a better position than that at Spokane.

Edwin R. Rockwell, formerly president of the Guarantee Electric Company, Chicago, Ill., announces the formation of the Rockwell Electric Company with offices in the First National Bank Building, Chicago. The new firm will handle electrical machinery and offers its services for electrical engineering in all its branches.

Arthur Bessey Smith, formerly professor of telephone engineering at Purdue University, will give a course of lectures on advanced telephone engineering at Lewis Institute, Chicago, beginning June 6, 1913. A laboratory course will be given in parallel with the lectures, which will be delivered on Monday and Wednesday evenings. The course includes twenty lectures, the title of the first one being "The Problems of the Telephone." The principal features of telephone engineering will be discussed in this course of lectures.

L. N. Carroll, of Riverside, Ill., has returned to Chicago after an extended stay in San Juan, Porto Rico, where he and Lewis Marquez, a native Porto Rican, installed numerous telephone equipments. Mr. Marquez accompanied Mr. Carroll on his return trip to Chicago.

T. E. Schmidt, local manager of the Wisconsin Telephone Company at Kaukauna, will have charge of both the Kaukauna and Wrightstown exchanges.

Kempster B. Miller of McMeen & Miller, 1454 Monadnock building, Chicago, will sail with his family on June 14 from Montreal, Canada. Geneva, Switzerland, will be their headquarters and Mr. Miller will look over telephone conditions on the continent. He expects to return to Chicago about middle July but his family will remain until the end of the summer.

L. S. Keith of McMeen & Miller, Monadnock building, Chicago, sailed May 24 with his wife from New York to Bermuda.

ELECTIONS.

At the Castana Mutual Telephone Company's annual meeting at Castana, Ia., the reports of the officers were read and indicated a successful and prosperous year. Questions bearing on the efficiency of the service were discussed and plans for improvement taken under advisement. The following were elected to office for the ensuing year: President, W. J. Donlin; vice-president, J. W. Nutt; secretary, W. H. Kennedy; treasurer, W. H. Waples, Jr.; manager, W. H. Rawlings; board of directors, M. F. Minthorn, P. T. Waples, W. W. Gingles and W. L. Wiley

At the stockholders' meeting of the Carroll County Independent Telephone Company, Savanna, Ill., A. P. Woodruff and W. W. Gillespie were elected directors.

The Chester Telephone Company, of Chester, S. C., held the annual meeting of its stockholders in the auditorium of the court house, with W. W. Coogler acting as chairman, and J. L. Davidson as secretary. The old board of directors on motion of the stockholders was reelected as follows: R. B. Caldwell, L. D. Childs and R. R. Hafner. The following officers for the ensuing year were reelected by the directors: President and treasurer, L. D. Childs; vice-president, R. R. Hafner, and secretary, R. B. Caldwell. The report of the president, L. D. Childs, indicated that the system had enjoyed a year of unprecedented prosperity. The magneto battery system was installed and $1,500 spent in line and cable improvements.

The annual meeting of the Cedar Valley Telephone Company, Burnell, Neb., was held in the Dare school building. The election of officers for the ensuing year resulted in Mark L. Williams being chosen president, while Joseph Jones and J. P. Douthet were reelected secretary and treasurer. The trustees are F. E. McMullen, Lee Reeder and Harry McDonald, the latter newly elected for his territory.

The annual meeting of the Woodhull Telephone Company was held in the town hall, Woodhull, Ill., and over thirty stockholders were present. W. P. Kirkland, the president, presided, and F. G. Tapper, the secretary, kept the records. The board of directors were authorized to take up the matter of incorporating the company under the laws of the state. The election of officers resulted in the selection of the following: W. P. Kirkland, president; H. F. Simmons, vice-president; F. G. Tapper, secretary; A. A. Mackey, treasurer; directors, P. E. Taylor, V. E. Setterdahl, A. E. Hawkinson, G. W. Larson, H. C. Stickney. The chair was authorized to appoint a committee of five to revise the by-laws of the company.

NEWS FROM THE FIELD.

ALABAMA.

B. F. Lanier, manager of the Opp Telephone Exchange, has contracted for a large fireproof building to be erected on Railroad avenue, which will be used as a telephone office and a residence. Work will be started on the building within a few weeks.

At a meeting of the city council held in the office of Mayor Jack M. Pratt, a franchise was granted the Southern Bell Tele-

phone and Telegraph Company to construct and maintain a line into and through the town of Carrollton. It is understood that work will begin at once and the line will be built from York to Reform.

The Southern Bell Telephone and Telegraph Company has connected Bessemer with several farmers' homes in the Hueytown and Rock Creek section, about fifteen farms having been brought in touch with the outside world by telephone connection. One line goes by what is known as the upper road and the other by the lower road.

The White Plains Telephone Company is the name of a new telephone line that has recently been constructed and put in operation southwest of Anniston in one of the fine agricultural sections of the county. The line connects with the exchange of the Southern Bell at Oxford, and is supported by 41 progressive farmers.

ARKANSAS.

The Johnson County Telephone Company of Clarksville has filed certificate of increase of capital stock from $15,000 to $50,000.

The Southwestern Telegraph and Telephone Company of Arkadelphia gave a public reception at the new telephone exchange building on occasion of the informal opening of the new exchange.

CALIFORNIA.

The Home Telephone & Telegraph Company has been granted a franchise in South Pasadena. G. B. Ocheltree, representing the telephone company, stated that as soon as the company could obtain necessary certificates of public necessity and convenience from the railroad commission, work would commence installing the necessary poles, wires, etc.

The telephone exchange planned for the San Francisco Exposition will have equipment for 2,000 stations and 30 operators. It will connect with all parts of the exposition, and will be provided for long-distance service. Public booths will be scattered all over the grounds.

ILLINOIS.

Cerro Gordo Telephone Company, Cerro Gordo; capital increased from $42,650 to $50,000.

The Central Union Telephone Company, in connection with its recent allotment of $50,000 pole line and cable reconstruction in the southwestern portion of Peoria, announces its decision to rebuild the entire Peoria-Canton-Lewistown pole line, and to string additional copper wire at a cost of $44,000.

The loss to the Inter-State Telephone Company in the Peotone fire is fixed at $1,000. The loss was to wires and poles.

Plans for the new exchange building of the Central Union Telephone Company in Rock Island call for a structure of architectural beauty—one which, according to those in charge of the improvement, will fit well into the residence district in which it will be located, at Eighteenth street and Seventh avenue.

Fairview Drive Telephone Company, Center School House, Waldo township, $750; operate a telephone system. Incorporators, J. W. Kirkton, J. Christian Luckert, J. O. Albrecht and D. J. Augsburger.

District Manager F. W. Kelley of the Central Union Telephone Company at Galesburg, received notice from the Chicago office of plans for $50,000 worth of improvements to be made on the company's lines between Galesburg and Quincy. The plans practically call for the rebuilding of the toll lines between these two cities and when the work is completed will mean that there will be four complete circuits from Galesburg to Quincy and one more circuit between Galesburg and Macomb than there now is between these two latter cities. The work of rebuilding these lines will probably begin about the first of June.

Northern Lights Telephone Company, Flanagan, $600; operate a telephone system. Incorporators, William Emm, Conrad Grau and Louis Rapp.

Swamp Central Telephone Company, Ashkum, $2,320; operate telephone lines. Incorporators, N. J. Wilson, A. H. Chandler and C. A. Giseburt.

At a recent meeting of the Business Men's Association of Plainfield the question of granting a new franchise to the Interstate Telephone Company was discussed. Finally a motion was made that it was the sense of the association that a new franchise be not granted, but rather that the old one be amended. The motion was thoroughly discussed and finally passed unanimously. The present rates are $1 per month for a house telephone and for business purposes $2, with a 5-cent toll to Joliet, and surrounding territory. It was on the question of raising the house rate that much of the discussion hinged. In all probability the latter will be raised 25 to 50 cents per month through the amendment of the franchise. The latter does not expire for another 12 years.

The Central Union Telephone Company closed a $7,300 realty deal whereby the H. W. Tremann lot, located at Eighteenth street, just off Seventh avenue, is acquired as a site for the new exchange building to be erected this year. At the same time announcement is made that extensive improvements will be made in the old quarters, in order to facilitate and improve the service up until the new home is in readiness. The company has appropriated $10,000 for immediate extensions to its Rock Island switchboard.

An ordinance has been passed granting the Home Telephone Company a franchise for twenty-five years in Galesburg. It was stated by members of the company, however, that the franchise would not be accepted until certain changes had been made regarding rates to be charged for telephones in the city.

INDIANA.

It developed at Fort Wayne that a deal has been practically completed whereby the local exchanges of the Central Union and the Home Telephone and Telegraph Company will be merged. Under the terms of the agreement, the Central Union is to surrender its local exchange field to the Home company, and in turn the latter company is to operate the Central Union long distance lines out of Ft. Wayne. The Home Telephone Company has approximately nine thousand subscribers in Ft. Waynes, while the list of the Central Union is but a few hundred.

Twin Springs has a new telephone line just completed in the west end, installed by the New London Company.

The Home Telephone Company, organized twenty years ago to combat the Central Union Telephone Company, announced at a recent meeting of the Elkhart city council that it had bought the Bell franchise July 12, 1912, and had operated under that franchise since that date.

Merchants' and Farmers' Telephone Company, Hillsboro, $10,000; to operate telephone lines. J. B. Short, W. M. Lyon, J. D. Linville.

The Whiteland Telephone Company of Whiteland has increased its capital stock $15,000.

IOWA.

A new rural telephone company at Creston, under the name of the Thayer, Audubon & Southwestern Telephone Company, has filed articles of incorporation. The capital stock is fixed at $288. The headquarters of the new organization will be a rural school house in Jones township.

The Shell Rock Valley Telephone Company, an independent company of Greene, has installed another new switchboard, and put on another operator. More new telephines have been asked for this spring than ever before.

The Clinton, Lyons and Fulton stockholders of the Tri-City Telephone Company spent a pleasant evening together at the Papsipinicon club, where a banquet was served. The stockholders get together two or three times a year and talk over business matters, and to mingle pleasure and work. There were about fifty present and the occasion was enjoyed.

The local telephone company at Dysart, known as the West Clark Company, has been dissolved and eight of its former stockholders have organized a new company which will be known as the Lone Tree Company. After the reorganization the new company started immediately to reconstruct its lines.

Negotiations are pending in Charliton for the transfer of the telephone system to the Lucas County Mutual Telephone Company.

Alleging damages to the amount of $7,597.40 by reason of losses it claimed to have suffered during the years it was enjoined by the city, the Marshall Telephone Company, by its attorneys, has filed a claim for that amount with the city of Marshalltown.

The Iowa Telephone Company has just strung twenty-five blocks of new cable at a cost of $10,000 at Muscatine.

Yorktown has achieved something for which it has been working a long while, and that is the connecting of the Bell and Rural telephone lines, making it possible for any farmer or any owner of the rural telephone to call up Council Bluffs, St. Joseph or any desired place from his own residence.

Architect F. E. Colby is drawing plans for two model telephone exchange buildings that are to be built at Akron and Westfield, Ia.

Campers at the Watch Tower and along Rock river in the vicinity of Sears will have the added convenience of city telephone service this year. Manager A. J. Beverlin of the Central Union Telephone Company stated that work has begun on cables to extend south from Brashar street in South Rock Island to Sears to provide connection for all campers who wish telephones.

Reconstruction of the Iowa Telephone Company's lines between Keokuk and Sandusky has commenced. The wires will be strung along the new road, known as the lake shore drive.

KANSAS.

Fremont Mutual Telephone Company, Fremont; capital, $2,000. Incorporators: J. F. Darrah, Marquette; C. G. Flohr, Marquette; G. Dahlsten, Lindsborg; A. R. Lundquist, Lindsborg; Otto Dahlsten, Marquette.

A new telephone company is to be formed in Chase county, in order to connect up the scattered districts.

The merger of the Home and Bell telephone companies at Leavenworth will occur at 12 o'clock, Sunday, May 17. All the Home telephones at that time will be discontinued and only the Bell telephones used. Telephone books containing the names of the subscribers are being published. It is said that it will be necessary to employ more operators. There will be 3,300 names in the new book against 3,800 names now in both telephone books.

The Santa Fe railroad is planning to use the telephone instead of the telegraph for train dispatching between Chanute and Ottawa and Ottawa and Chanute and Tulsa on the Southern Kansas division. An appropriation of $25,770 has been made for this purpose, and it is expected that the change will be made this year.

Leavenworth's telephone merger has become a reality. The People's Home Company connected its system with that of the Bell Company, which it acquired several months ago, and they promise better service than the city ever before has known.

KENTUCKY.

Mt Victory Mutual Telephone Company, Mt. Victory. Capital $1,200. Incorporators: James Jones, J. M. Ratliff, Melvin White and Jacob Jenkins.

An agreed order has been entered in Judge Kirby's court at Louisville postponing until July 1 the date upon which the Louisville Home Telephone Company must take out its party lines according to its charter.

Tarter-Logan Telephone Company, Brownsville; capital, $3,000. Incorporators: O. N. Tarter, D. A. Logan and Bertha Tarter.

A deed of conveyance was filed in the county clerk's office by the Central Home Telephone & Telegraph Company of New Jersey to the Central Home Telephone & Telegraph Company of Delaware, involving nineteen independent telephone and telegraph companies in Kentucky, including the Bowling Green Home Telephone Company. The total amount of bonds, stock and notes is given at $1,530,819.28. The local company's common stock amounts to $87,300 and bonds $98,500. The merger will not change the management of the local company.

MICHIGAN.

The announcement that the Bell Telephone Company, its merger with the Home interests completed, was planning to raise rates, has induced the university at Ann Arbor to serve notice that it will discontinue its private exchange and install an automatic system of its own. There are more than 200 telephones on the university's branch exchange.

The Citizen's Telephone Company has had plans prepared for a new exchange building which will be built at Allegan this season, the work to begin at once. The company now occupies leased quarters.

The ninth annual report of the Michigan State Telephone Company for the fiscal year, ending December 31, shows gross earnings for the year were $5,193,923, an increase of $56,585. The company expended during the year $1,133,215 in addition and improvements to physical properties and secured independent companies centering in Detroit.

The work of combining the Home telephone exchanges with the Michigan state exchanges both in Wyandotte and Trenton was completed recently. The combination widens the area of the two Michigan state exchanges to take in Rockwood and Flat Rock. Seven lines are added to the Michigan state service between Wyandotte and Trenton and five lines are added into Detroit. A three-sectioned switchboard was installed in the Wyandotte exchange for the increased service.

The Michigan State Telephone Company has a large force of men at work at Port Huron, in changing the telephone system. The work requires several weeks.

MINNESOTA.

The Dakota Central Telephone Company is erecting a three-story exchange building at Watertown and installing an automatic plant at a cost of $145,000.

The voters of Thief River Falls decided at a special election just held to issue bonds and take over the local plant of the Tri-State Telephone Company. Last fall the city council entered into a contract with the Tri-State Telephone & Telegraph Company, which gave the Tri-State the privilege of building an entirely new telephone system in this city. The conract, however, provided that the city reserved the right to purchase the plant for the sum of $30,000 plus the price of all telephines installed over and above the amount stated in the contract.

MISSOURI.

Mutual Union Telephone Company, Abingdon; name changed to Abingdon Home Telephone Company and number of directors increased from five to nine.

Intertownship Telephone Company, Shabona; capital stock increased from $5,000 to $20,000.

The state board of equalization met at Jefferson City and organized for the valuation of the railway bridge, telegraph and telephone properties of the state for taxes for the present year. Governor Major was elected president, and State Treasurer Deal vice-president. State Auditor Gordon is made secretary by law. The dates for the hearings will be from about the middle of May to the middle of June.

NEBRASKA.

E. E. Waterman, of Maldrege, has been awarded the contract for the construction of the new telephone building. Work is to commence as soon as the weather will permit.

Work will soon be started on the new building which the Lincoln Telephone and Telegraph Company will erect on the location of the present automatic plant at Hastings. In order to provide room for the combined plants of the Bell and automatic systems an addition will probably be built on the lot west of the present building and a second story may be built over all.

The Nebraska Telephone Company has moved into its new building on Park avenue, Fremont. Consolidation of the Bell and independent systems will be brought about immediately, it is said. The new building, which was erected especially for the telephone business, cost $12,000.

The Lincoln Telephone and Telegraph Company filed a statement with the city clerk showing that the amount of telephone revenue for March on which an occupation tax has to be paid was $19,005.90. The toll revenue amounted to $6,093.02. The total amount, $25,098.92. The occupation tax amounted to $501.96.

Governor Morehead, of Kearney, has signed the county telephone bill and it is now lawful for any county to enter into competition with any private telephone company now in existence.

Plans are being made to organize a new telephone company in Gage county, under the county telephone law, recently passed by the state legislature. The stockholders in the Wymore Independent Telephone Company have decided to dissolve their company and refund money paid in on stock subscriptions. This action was taken because of changed conditions in local telephone affairs.

The two telephone systems in Polk county have been united, the Polk County Telephone taking over the Bell business.

NEW JERSEY.

The telephone company at Cranford has changed its method of operating its service, the magneto system, to the common battery system, thus doing away with turning the crank when calling central. A switchboard costing $12,000, and having a capacity of 1,600 lines, has been installed in the new central office in the Trust building.

NEW YORK.

Fuller Mouthpiece Corporation of Manhattan; mouthpieces for telephones; $25,000. Claude V. Fuller, Frank W. Miller, Nelson D. Moulds, 92 William Street, New York.

A certificate of incorporation has been filed with the secretary of state by the Telephone Girls Social Club of Brooklyn. Its directors are as follows: Katie Donnelly, Clara Lents and May Neary of Brooklyn.

William W. Bush, chairman of the East Syracuse Business Men's Association and acting in behalf of that organization, through Attorney Nelson L. Lansing, applied for a telephone franchise at a recent meeting of the village board. It is said the franchise will be granted probably at the next meeting and that the New York Telephone Company soon will have a rival in the field. The company will be known as the Co-operative, and already there as more than 350 signers. Each pledges himself to take $10 in stock, while some of the subscribers will put in from $100 to $500.

The common council of Cortland, after a session which lasted until 2 o'clock, granted the New York Telephone Company a franchise to place an underground conduit in Main street from east Main to Williams streets and in Clinton avenue and Railroad street from Main to Church streets.

NORTH DAKOTA.

The Farmers' Telephone Company of Gardena; capital stock, $9,750. Incorporators: Adolf Klebe, Peter Hett and John Boettcher, all of Gardena. Filed March 24.

Karlsruhe Telephone Company of Karlsruhe, N. D.; capital stock, $6.000. Incorporators: John J. Wald, John F. Wald and Christ Merck, all of Karlsruhe, N. D. Filed March 28.

The city council of Fargo has ordered the Northwestern Telephone Company to connect with the Tri-State switchboard by July 1 and to remove all telephone poles except those necessary to make the connection.

Articles of incorporation have been filed with Secretary of State Thomas Hall for the Lincoln Valley Telephone Company of McClusky. The papers state that there will be 18 miles of main line and 10 miles of branch lines and that the company will be for the benefit of the farmers living near McClusky. The company is capitalized for $6,000 and the following men have been named as members of the first board of directors: August Heib, John Werner and Leonard Baum of McClusky and Ludwig Baumberger and Jacob Huft of Lincoln, in Sheridan county.

The Farmers' Mutual Telephone Company of Lunds Valley, capital stock, $25,000; incorporators, N. G. Evans, Andrew Roise and Lars Enerson, all of Lunds Valley.

The Pearl Lake-Gladstone Telephone Company has been organized. The line to be constructed will be out of the city of LaMoure and there will be a total of seventy miles, the estimated total cost of which will be $5,000. The company is capitalized at $10,000 and the first board of directors will be as follows: C. H. Kelly, Carl A. Evers, C. J. Sanders, Elling Satreaas, all of LaMoure and Emil E. Ellinson of Litchville. The postoffice address of the company will be LaMoure.

OHIO.

Objections to provisions in the contract for the use of conduits on the Cherry street bridge at Toledo were called to attention of the finance committee by the Central Union Telephone Company. City Solicitor Schreiber and Service Director Cowell were instructed to confer with telephone officials regarding changes. One clause objected to provides that the city may change the rates every five years. The clause will be changed to read that the rates may be changed every five years subject to arbitration. The initial rates will be 7 cents per duct foot for conduits used and 3 cents per duct for conduits reserved.

Mt. Victory Mutual Telephone Company, Mt. Victory; capital $1,200. Incorporators: James Jones, J. M. Ratlin, Melvin White and Jacob Jenkins.

The earnings of the Bell telephone system in the United States for January and February were $3,275,861 in excess of those in 1912 for the same period, and the surplus earnings were $2,017,294, against $1,981,546.

An official request has been made by the retail merchants' board of the Youngstown chamber of commerce for a consolidation of the Bell and Youngstown telephone systems in Youngstown. The matter has been under consideration for some time but no steps have been taken in that direction as yet.

To expedite the installing of a new telephone system at Napoleon, the city council, under suspension of the rules, granted a franchise to Charles W. Jackson and his assignees. He will assign it to the Henry County Mutual Telephone Company as soon as it is legally organized. The franchise is indeterminate and becomes operative in sixty days. The action is a sequel to the recent canceling of the Napoleon Telephone Company's franchise.

OKLAHOMA.

The Amorita Home Mutual Telephone Company has been incorporated with a capital stock of $5,000 by J. L. Presnall, W. H. Johnson and L. P. Millspaugh, all of Amorita.

By means of the telephone and dictagraph Gov. Cruce at his home in Oklahoma City, 120 miles away, addressed 325 members of the Oklahoma State Press Association, who were guests of Tulsa at a dinner.

The central district traffic conference of telephone girls met at Ardmore for three days' session. Meetings were held at the Pioneer Telephone Company's building. The conference was one of several in the state, and was designed to improve the methods of the Pioneer Company. Thirty girls were in attendance.

Guthrie Southwestern Telephone Company of Guthrie, R. F. D. No. 4; capital, $200. Incorporators: W. N. Kellogg, C. P. James, L. J. Hirzel, Guthrie, R. F. D. No. 4.

PENNSYLVANIA.

Telephone extensions are to be made through Clementon to Brownsville and Chews, which will serve a large number of prosperous farmers.

"The Blue Mountain Telephone & Telegraph Company" is the name of the new company which is being organized by the citizens of several state belt towns at Bangor who object to the Slate Belt Telephone Company raising the rates. In the new company none but users of telephones will be allowed to purchase stock.

There is a strong belief in the street at Philadelphia that the Keystone Telephone Company will begin to pay dividends on its cumulative preferred next fall. This belief is based on the market price of the bonds and their probable refunding.

The Mahoning Rural Telephone Company is building a line to Ashfield. The company, although in its infancy, has now nearly 175 telephones.

The Lehigh & New England Railroad of Philadelphia is putting in a perfected telephone system on its lines within the state, with which it will supplant, by June 1, the telegraph in the operations of its trains. The company has for some years been operating trains to outlying points where the business did not warrant the maintenance of a station and agent.

The Eastern Pennsylvania Independent Telephone Association, representing all independent companies east of Altoona, was organized at Harrisburg with the election of J. F. Stockwell of Philadelphia as president and O. K. Hines of Harrisburg, secretary and treasurer.

In an opinion filed at Trenton the supreme court affirms the action of the common council of Beverly in rescinding an extension of the contract under which the Delaware & Atlantic Telephone Company was authorized to operate in that municipality.

The finance committee of councils at Harrisburg directed that the ordinance reducing the bond of the Cumberland Valley Telephone Company from $25,000 to $10,000 be referred to the sub-committie on finance.

SOUTH CAROLINA.

The telephone company is having a building erected at Florence especially for its convenience for the installation of a new multiple switchboard system and all that is latest and best in telephone equipment.

SOUTH DAKOTA.

The farmers of two townships in the vicinity of Revillo are organizing a farmers' telephone company and will construct lines to be connected with the Revillo system. The local business men are giving the project their active support.

Arrangements are being made to construct a telephone line from Naples to Vienna, and service will be furnished those living along the line.

The city commissioners have granted the Franklin Telephone Company the right to extend its lines and establish telephones at certain points in Madison. The company's lines cover a great deal of territory in this vicinity.

At a recent meeting in Lemmon the city council ordered the company to remove its wires, cables and all other telephone material from the streets and alleys, and the citizens were requested to disconnect their telephones not later than May 11 next, when the franchise of the telephone company terminates. The company has refused to accept a new ordinance setting forth the conditions on which a new franchise will be granted, and it is expected the controversy will be taken to the courts.

TENNESSEE.

Farmers' Union Telephone Company, Warren county; amendment increasing capital stock from $5,000 to $15,000.

The Home Telephone Company of Clarksville was the first organization of the kind to send its rate schedule to the Tennessee railroad commission. Under a recent order issued by the commission, all express companies and telephone and telegraph companies of the state are required to file their tariff rates with the commission without unnecessary delay.

TEXAS.

A franchise has been granted by the city of Bartlett to the Bartlett and Davilla Mutual Telephone Company. Lines will be run from Florence, Jarrell, Holland, Lampasas, Prairie Dell, Salado, Nolanville and Kelsoville, and the company will operate on the mutual or rural plan.

The Southwestern Telegraph and Telephone Company is building another line to Fort Worth with a view to taking care

of the increased volume of business at Cleburne. The company is also placing the material on the ground for the placing of the wires here under the ground, which will enter their modern building, which is to be put up this year.

Burton Telephone Company, Burton, Washington county; capital stock, $1,600. Incorporators: C. W. Homyer, T. J. Awalt, Thomas Watson and others.

Joe Glass of Cleburne stated that he would be the superintendent of a new telephone line which would extend southwest of this city. The farmers along the line will have access to the city board, and the city subscribers will be able to communicate with any of the new subscribers, the same as if they lived in the city.

The South Texas Telephone Company will build a 25x100 two-story brick building at Sixth and Waco streets, Houston, for a central office and will put all wires through the business section underground.

The telephone company has completed the metallic line to Alpine and communication is now established to that town and Marfa.

G. Pike, district commercial agent for the Southwestern Telegraph & Telephone Company, with Houston headquarters, met with the Commercial Club at Orange and discussed the proposition of a toll line for his company to extend from Orange to Newton. Mr. Pike assured the club that the line would be built at all hazards, and that the work would begin without delay.

The Southwestern Telegraph & Telephone Company has added another section to the switchboard in Fredericksburg and has made other improvements in the local office there.

The South Texas Telephone Company has called for bids on a two-story brick, 25x100, corner of Seventh and Beaumont streets, Houston.

A new telephone line in the Kneese and Spring Creek settlements in this county has been built by the farmers in that section, using twelve new telephones and connecting with the main office in Fredericksburg.

Manager W. P. Duckett of the Snyder telephone exchange has just completed the establishment of a farm telephone line west from Snyder, a distance of fifteen miles, to the southwest Mr. Duckett has greatly enlarged the telephone service here since the Southwestern purchased the plant.

Kurten Telephone Company of Kurten, Brazos county; capital stock, $900. Incorporators: W. Payne, J. J. Kasiske, W. F. Odom.

Bay City is to have an up to date telephone system and besides there will at once be spent in that town $25,000 by the Southwestern Telephone & Telegraph Company in providing an exchange with modern equipment.

The Southwestern Telephone Company has recently placed about $2,000 worth of material on the ground for improving the telephone system at Houston.

VIRGINIA.

Banister Telephone Company of Springdale. Capital, $1,000 to $5,000. N. O. Cole, president; S. T. Cole, vice-president; Mrs. A. J. Arendall, secretary and treasurer, all of Vernon Hill.

The telephone company has announced its purpose of spending $200,000 in Richmond in extending its conduit system, already miles ahead of the requirement of the city underground ordinance. The more permanent construction eliminates danger of accidents and insures the service from interruption in time of sleet or storm.

The Chesapeake & Potomac Telephone Company will keep open house every Thursday morning from 9 o'clock to 11 o'clock at its central office on East Washington street, Suffolk, and all patrons and citizens generally are invited to visit the offices. The company has recently installed many improvements and the latest switchboards.

WASHINGTON.

Telephone franchises have been granted to Pleasant View Telephone Company to operate out of Chehalis toward Boistfort and Newaukum, and the Finish Telephone Company, to operate out of Winlock.

Commissioner Fassett of Spokane is taking an active interest in drafting resolutions to be presented by the city council to the federal government, asking the taking over of all national telephone and telegraph systems. He points out the Pacific States franchise in Spokane is due to lapse within two years, making the question particularly pertinent to that city.

WEST VIRGINIA.

Secretary of State Reed announces that the board of public works will be in session in the governor's room in the capitol at Charleston, May 5, 6 and 7 for the purpose of hearing representatives of the telephone companies, railroads and other public service corporations relative to their assessments.

Bond to the amount of $200,000 was filed by the special commissioners who have been granted permission by Judge A. G. Dayton of the federal court of northern West Virginia to sell the holdings of the National Telephone Company. After the legal advertising has been completed the sale of the property according to the terms of Judge Dayton's recent order may be consummated and indications are that the end is near in the now noted litigation in connection with National telephone affairs.

WISCONSIN.

The telephone line on Dead Lake Prairie has been extended up the valley.

Cuba City Telephone Exchange Company, Cuba City; capital, $2,025. Incorporators: Henry Winn, W. H. Wilkey, James Jeffrey, F. A. Flomer, J. E. Kinney, A. B. Bankvill.

Another new section to the immense switchboard in the offices or central station of the Wisconsin Telephone Company at Racine will be added this summer. This improvement will cost from $15,000 to $20,000, and when the board is in will take care of 1,300 more lines.

MISCELLANEOUS.

BRONSON, MICH.—The Southern Michigan Telephone Company has finally completed negotiations with the Bell Company, whereby it has secured the counties of St. Joseph and Branch in exchange for Hillsdale county.

BONHAM, TEX.—Texas Telephone Company, Bonham, changing name to Bonham Telephone Company.

CENTRALIA, WASH.—At a meeting held in Toledo between the officers of the Home Telephone Company, of Silver Creek, and the Farmers' Independent Telephone Company, of Salkum, the Silver Creek people decided to purchase the holdings of the Farmers' Independent in Toledo. By the agreement the Farmers' Independent will pay the other company 25 cents a month for each telephone in Toledo.

CINCINNATI, O.—The use of the telephone for handling train orders and messages is to be extended over the 117 miles of the Queen & Crescent route, between Cincinnati and Danville, Ky., according to announcement made from Cincinnati by Horace Baker, general manager. Authority for the installation of the system has already been granted. For the last two years the Q. & C. has been using the telephone on 137 miles. between Danville and Oakdale, Ky.

FRANKLIN, IND.—The entire Bell system of telephones in Johnson county, with the exception of toll lines to Trafalgar, Banta, Nineveh and Greenwood, has been acquired by the Franklin Telephone Company. All Bell telephones will be attached to the Franklin exchange. A new automatic system will be installed. Several thousand dollars will be expended on the improvement of the service.

HOUSTON, TEX.—The Southwestern Telegraph and Telephone Company has formally opened its new eight-story plant on Capitol avenue and San Jacinto street.

HAYMARSH, N. D.—The farmers of Haymarsh in Morton county will endeavor to organize a co-operative telephone association.

HOWE, NEB.—The Farmers' Mutual Telephone Company, of Howe, has sold the controling stock to the Auburn Telephone Company, which now has control of all the telephone lines in Nemaha county.

MARSHFIELD, WIS.—One cent a call is the average cost of the service of the subscribers of the Marshfield Telephone Company, according to tests and estimates of the company for the year 1912. The company's annual report to the state treasurer for the year 1912 has been issued. Upon this report the state determines the amount of tax the company must pay. Eighty-five per cent of it goes to the city, the balance to the state.

MAQUOKETA, IA.—The Maquoketa Home Telephone Company exchange has been sold to T. A. Potter of Mason City and W. A. Eckles of Nora Springs, Ia., putting to rest rumors to the effect that the company had been cosolidated with the Bell system. At a meeting of the directors T. A. Potter was chosen president, and on the resignation of C. Tilton, W. A. Eckles was elected secretary and treasurer. Miss Grace Knittle will be manager and assistant treasurer. The four named, with R. J. McEwin, will constitute the board of directors.

MT. VERNON, S. D.—Steps have been taken to consolidate the Blendon Rural and the Davison County Rural telephone companies, and if this is done an exchange will be opened in Mt. Vernon. The two companies have a network of wires through this part of the state.

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